GOVERNMENT OF TAMIL NADU

STANDARD SEVEN

TERM - I

VOLUME - 3

SCIENCE
SOCIAL SCIENCE

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Department of School Education

Untouchability is Inhuman and a Crime

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PREFACE

The Science textbook for standard Seven has been prepared following the guidelines given in the National Curriculum Framework 2005. The book enables the reader to read the text, comprehend and perform the learning experiences with the help of teacher. The Students explore the concepts through activities and by the teacher demonstration. Thus the book is learner centric with simple activities that can be performed by the students under the supervision of teachers.

HOW TO USE THE BOOK?

- ❖ The First term VII Science book has seven units.
- ❖ Two units planned for every month including computer science chapter has been introduced.
- ❖ Each unit comprises of simple activities and experiments that can be done by the teacher through demonstration if necessary student's can perform them.
- ❖ Colourful info-graphics and info-bits enhance the visual learning.
- ❖ Glossary has been introduced to learn scientific terms.
- ❖ The "Do you know?" box can be used to enrich the knowledge of general science around the world.
- ❖ ICT Corner and QR code has been introduced in each unit for the first time to enhance digital science skills.

Lets use the QR code in the text books ! How ?

- ❖ Download the QR code scanner from the Google play store/ Apple App Store into your Smart phone.
- ❖ Open the QR code scanner application
- ❖ Once the scanner button in the application is clicked, camera opens and then bring it closer to the QR code in the text book.
- ❖ Once the camera detects the QR code, a URL appears in the screen.
- ❖ Click the URL and go to the content page.

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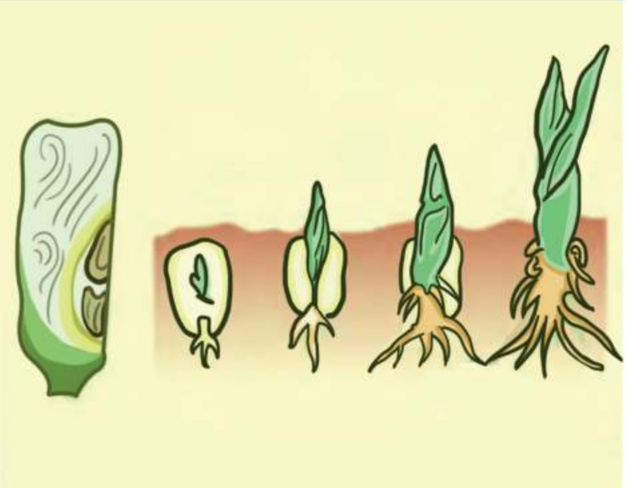
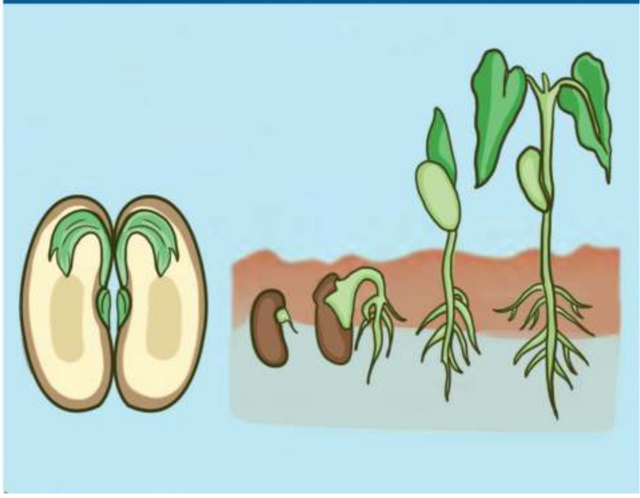
Seed Germination of Monocot Plant



Seed Germination of Dicot Plant



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Assessment

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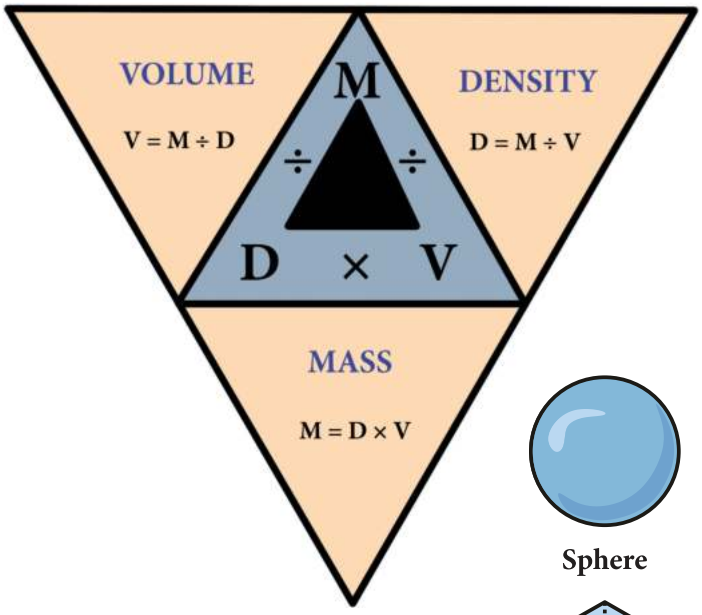
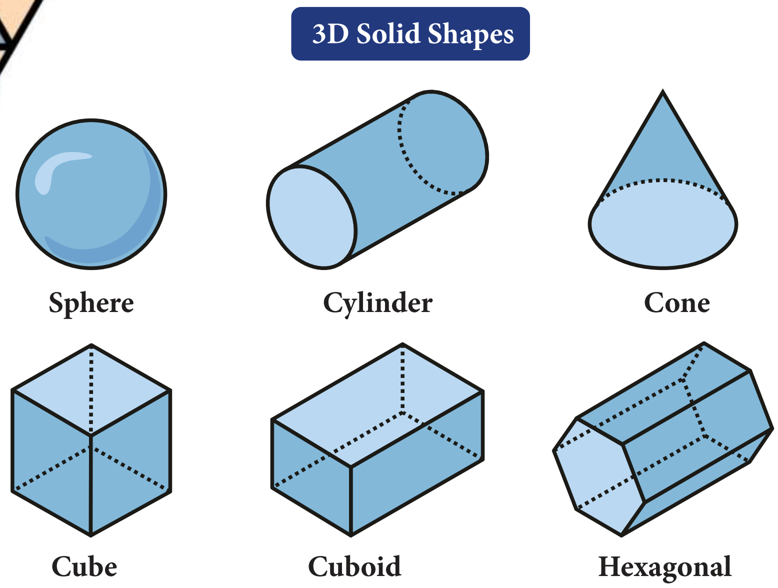
Unit 1

Measurement





Learning Objectives

After studying this unit, students will be able to:

8B20Y

- identify fundamental and derived physical quantities.
- identify fundamental and derived units.
- obtain units for certain derived quantities.
- measure the area and volume of some regular shaped and irregular shaped objects.
- convert the volume of objects from cubic metre to litre and vice versa.
- calculate the density of solids and liquids.
- define astronomical unit and light year.

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Introduction

In day to day life, we measure many things such as weight of fruits, vegetables and food grains, volume of liquids, temperature of the body, speed of the vehicles etc., Quantities such as mass, weight, distance, temperature, volume are called physical quantities. A value and a unit are used to express the magnitude of a physical quantity. For example, let us assume that you walk 2 kilometre everyday. In this example '2' is the value and 'kilometre' is the unit used to express the magnitude of distance which is a physical quantity. In this lesson, we are going to study about fundamental quantities, derived quantities such as area, volume and density, and measurement of larger quantities.

1.1 Fundamental Quantities and Derived Quantities

Generally, physical quantities are classified into two types. They are: fundamental quantities and derived quantities.

1.1.1 Fundamental Quantities

A set of physical quantities which cannot be expressed in terms of any other quantities are known as fundamental quantities. Eg. Length, Mass, Time. Their corresponding units are called fundamental units. There are seven fundamental physical quantities in SI Units (System of International Units). They are given in Table 1.1.

Table 1.1 Fundamental quantities and their units

Fundamental quantity	Fundamental unit
Length	metre (m)
Mass	kilogram (kg)
Time	second (s)
Temperature	Kelvin (K)
Electric current	Ampere (A)
Amount of substance	mole (Mol)
Luminous intensity	Candela (cd)

1.1.2 Derived quantities

All other physical quantities which can be obtained by multiplying, dividing or by mathematically combining the fundamental quantities are known as derived quantities. Eg. Area and volume. Their corresponding units are called derived units. Some of the derived quantities and their units are given in Table 1.2.

Table 1.2 Derived quantities and their units

Derived quantity	Unit
Area = Length × Breadth	m^2
Volume = Length × Breadth × Height	m^3
Speed = Distance / Time	ms^{-1}
Electric Charge = Electric Current × Time	C
Density = Mass / Volume	$kg\ m^{-3}$

*C - Coulomb

1.2 Area

Area is a measure of how much space is there on a flat surface. The area of a plot of land is derived by multiplying its length and breadth.

Area = length × breadth

The unit of the area is m^2 (Read as square metre). Area is a derived quantity as we obtain it by multiplying the fundamental physical quantity length (length x breadth).

Problem 1.1

What is the area of 10 squares each having side of 1 m?

Area of a square = side × side
= 1 m × 1 m
= 1 m^2 or 1 square metre

Area of 10 squares = 1 square metre × 10
= 10 square metre

1.2.1 Area of regularly shaped objects

The area of regularly shaped objects can be calculated using the relevant formulae. In Table 1.3, the formulae used to calculate the area of certain regularly shaped figures are given.

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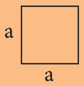
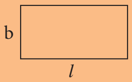
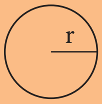
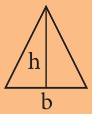
Table 1.3 Area of some regularly shaped objects

S.No.	Plane figure	Diagram	Area
1	Square		side × side $a \times a = a^2$
2	Rectangle		length × breadth $l \times b = lb$
3	Circle		$\pi \times (\text{radius})^2$ $\pi \times r^2 = \pi r^2$
4	Triangle		(1/2) × base × height $1/2 \times b \times h$

Problem 1.2

Find the area of the following regular shaped figures (Take $\pi = 22/7$).

a. A rectangle whose length is 12 m and breadth is 4 m.

b. A circle whose radius is 7 m.

c. A triangle whose base is 6 m and height is 8 m.

Solution

a. Area of rectangle = length × breadth
$= 12 \times 4 = 48 \text{ m}^2$

b. Area of circle $= \pi \times r^2 = (22/7) \times 7 \times 7$
$= 154 \text{ m}^2$

c. Area of triangle = 1/2 × base × height
$= 1/2 \times 6 \times 8 = 24 \text{ m}^2$

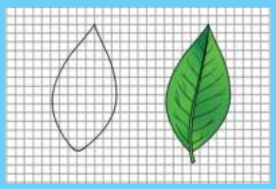
1.2.2 Area of irregularly shaped objects

In our daily life, we encounter many irregularly shaped objects like leaves, maps, stickers of stars or flowers, peacock feather etc. The area of such irregularly shaped objects cannot be calculated using any formula.

How can we find the area of these irregularly shaped objects? We can find the area of these figures with the help of a graph sheet. The following activity shows how to find the area of irregularly shaped plane figures.

ACTIVITY 1

Take a leaf from any one of the trees. Place it on a graph sheet and draw the outline of the leaf with a pencil. Remove the leaf. You can see the outline of the leaf on the graph sheet.



i. Now, count the number of whole squares enclosed within the outline of the leaf. Take it as M.

ii. Then, count the number of squares that are more than half. Take it as N.

iii. Next, count the number of squares which are half of a whole square. Note it as P.

iv. Finally, count the number of squares that are less than half. Let it be Q.

Now, the approximate area of the leaf can be calculated using the following formula.

Approximate area of the leaf
= M + (3/4) N + (1/2) P + (1/4) Q square cm.

Area of the leaf = ______________cm^2.

This method can be used to find the area of regularly shaped figures also. In the case of square and rectangle, this method gives the measure area accurately. This method can be used to calculate the area of any irregularly shaped plane figures.

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ACTIVITY 2

Draw the following regularly shaped figures on a graph sheet and find their area by the graphical method. Also, find their area using appropriate formula. Compare the results obtained in two methods by tabulating them.

a. A rectangle whose length is 12 cm and breadth is 4 cm.

b. A square whose side is 6 cm.

c. A circle whose radius is 7 cm.

d. A triangle whose base is 6 cm and height is 8 cm.

S. No.	Shape	Area using formula	Area using graphical method

DO YOU KNOW?

One square metre is the area enclosed inside a square of side 1 metre. Even though area is given in square metre, the surface need not to be square in shape

1.3 Volume

The amount of space occupied by a three dimensional object is known as its volume.

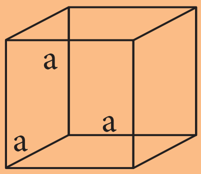
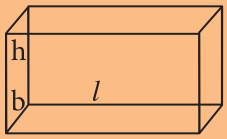
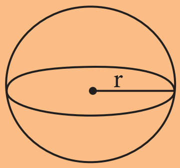
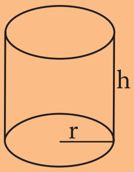
Volume = Surface area × Height

The SI unit of volume is cubic metre or m^3.

1.3.1 Volume of regularly shaped objects

As in the case of area, the volume of a regularly shaped objects can also be determined using an appropriate formula. Table 1.4 gives the formulae used to calculate the volume of the regularly shaped objects.

Table 1.4 Volume of regularly shaped objects

S.No.	Objects	Figure	Volume
1	Cube		side × side × side $a \times a \times a = a^3$
2	Cuboid		length × breadth × height $l \times b \times h = lbh$
3	Sphere		$4/3 \times \pi \times (\text{radius})^3$ $4/3 \times \pi \times r^3 = 4/3\ \pi\ r^3$
4	Cylinder		$\pi \times (\text{radius})^2 \times$ height $\pi \times r^2 \times h = \pi r^2 h$

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Problem 1.3

Find the volume of the following (Take $\pi = 22/7$).

a. A cube whose side is 3 cm.

b. A cylinder whose radius is 3 m and height is 7 m.

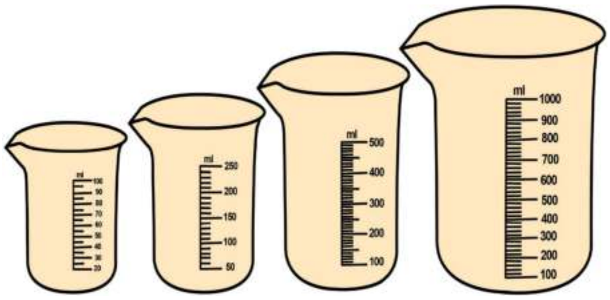
Solution

a. Volume of a cube = side × side × side
   = 3 cm × 3 cm × 3 cm = 27 cubic cm or cm^3.

b. Volume of a cylinder = $\pi \times (\text{radius})^2 \times \text{height}$
   = $22/7 \times 3 \times 3 \times 7 = 198\ m^3$.

1.3.2 Volume of Liquids

Liquids also occupy some space and hence they also have volume. But, liquids do not possess any definite shape. So, the volume of a liquid cannot be determined as in the case of solids. When a liquid is poured into a container, it takes the shape and volume of the container. The volume of any liquid is equal to the space that it fills and it can be measured using a measuring cylinder or measuring beaker. The maximum volume of liquid that a container can hold is known as the capacity of the container. A measuring container is graduated as shown in figure.



Measuring containers

The volume of a liquid is equal to the volume of space it fills in the container. This can be directly observed from the readings marked in the measuring containers. If we notice the measuring cups given in figure carefully, we can observe that the readings are marked in the unit of 'ml'. This actually represents millilitre. To understand this unit of volume, let us first understand how much a litre means. Litre is the commonly used unit to measure the volume of liquids. We know that the unit of volume is cubic cm if the dimensions of the object are given in cm. This cubic cm is commonly known as 'cc'. A volume of 1000 cc is termed as one litre (*l*).

1 litre = 1000 cc or cm^3

1000 ml = 1 litre

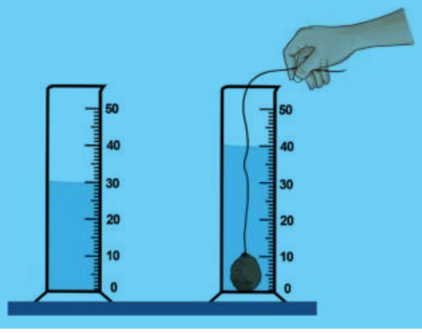
1.3.3 Volume of irregularly shaped objects

There is no formula to determine the volume of irregularly shaped objects as in the case of area. For such objects, volume can be determined using a measuring cylinder and water.

ACTIVITY 3

Take a measuring cylinder and pour some water into it (Do not fill the cylinder completely). Note down the volume of water from the readings of the measuring cylinder. Take it as V_1. Now take a small stone and tie it with a thread. Immerse the stone inside the water by holding the thread. This has to be done such that the stone does not touch the walls of the measuring cylinder. Now, the level of water will raise. Note down the volume of water and take it as V_2. The volume of the stone is equal to the raise in the volume of water.

Volume of stone = $V_2 - V_1$



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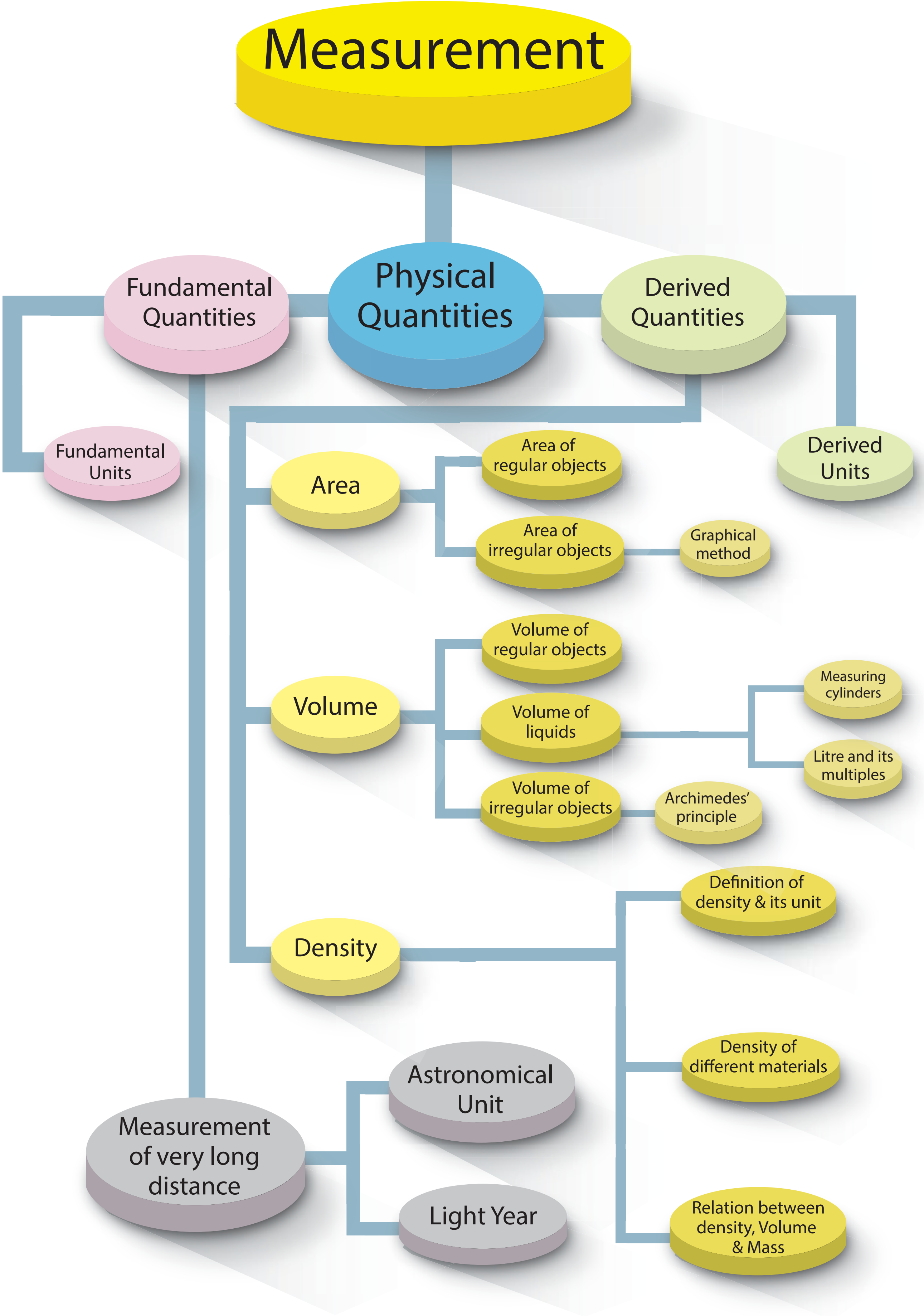

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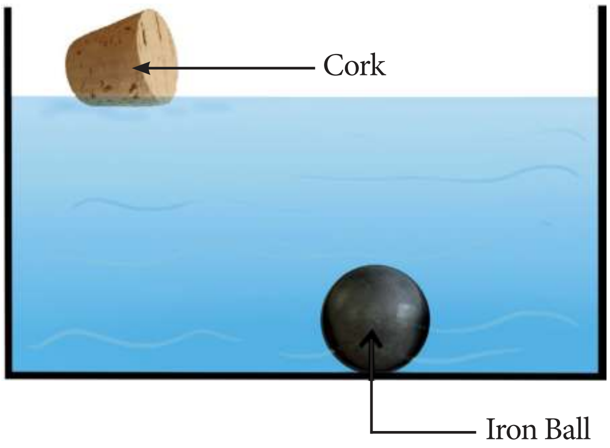
> **DO YOU KNOW?**
>
> To measure the volume of liquids, some other units are also used. Some of them are gallon, ounce, and quart.
>
> *1 gallon = 3785 ml*
>
> *1 ounce = 30 ml*
>
> *1 quart = 1 litre*

1.4 Density

Take water in a beaker and drop an iron ball and a cork into the water. What do you observe? The iron ball sinks and the cork floats as shown in figure. Can you explain why?



Iron ball sinks while cork floats in water

If your answer is heavy objects sink in water and lighter objects float in water, then, why does a metal coin sinks in water whereas a much heavier wooden log floats? These questions can be answered if we understand the concept of density.

Lighter coin sinks while heavier wooden log floats

ACTIVITY 4

a. Take an iron block and a wooden block of same mass (say 1kg each). Measure their volume. Which one has more volume and occupies more volume?
Ans: ____________________

b. Take an iron block and a wooden block of same size. Weigh them and measure their mass. Which one of them has more mass?
Ans: ____________________

From activity 4, we observe that wooden block occupies more volume than the iron ball of same mass. Also, we observe that wooden block is lighter than the iron block of same size.

The lightness or heaviness of a body is due to density. If more mass is packed into some volume, it has greater density. So, the iron block will have more mass than the wooden block of the same size. Therefore, iron has more density.

Density of a substance is defined as the mass of the substance contained in unit volume (1 m^3). If the mass of a substance is M and volume is V, then, its density is given as

$$Density\ (D) = \frac{Mass\ (M)}{Volume\ (V)}$$

$$D = \frac{M}{V}$$

SI unit of density is kg/m^3. The CGS unit of density is g/cm^3.

1.4.1 Density of different materials

Different materials have different densities. The materials with more density are called denser and the materials with less density are called rarer. The density of some widely used materials are listed in Table 1.4.

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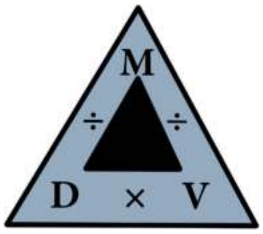
Table 1.5 Density of some common substances, at room temperature

S.No.	Nature	Materials	Density (kg/m^3)
1	Gas	Air	1.2
2	Liquid	Kerosene	800
3		Water	1,000
4		Mercury	13,600
5	Solid	Wood	770
6		Aluminium	2,700
7		Iron	7,800
8		Copper	8,900
9		Silver	10,500
10		Gold	19,300

The relationship between mass, density and volume are represented in the following density triangle.



- Density = Mass/ Volume
- Mass = Density × Volume
- Volume = Mass / Density

Problem 1.4

A solid cylinder of mass 280 kg has a volume of 4 m^3. Find the density of cylinder.

Solution

$$\text{Density of cylinder} = \frac{\text{Mass of cylinder}}{\text{Volume of cylinder}}$$

$$= \frac{280}{4} = 70\ kg/m^3$$

Problem 1.5

A box is made up of iron and it has a volume of 125 cm^3. Find its mass if the density of iron is 7.8 g / cm^3.

Solution

Density = Mass / Volume

Hence, Mass = Volume × Density

= 125 × 7.8 = 975 g.

DO YOU KNOW? Water has more density than oils like cooking oil and castor oil, although these oils appear to be denser than water. Density of castor oil is 961 kg/m3. If we put one drop of water in oil, water drop sinks. But, if we put one drop of oil in water, oil floats and forms a layer on water surface. However, some oils are denser than water.

Problem 1.6

A sphere is made from copper whose mass is 3000 kg. If the density of copper is 8900 kg/m, find the volume of the sphere.

Solution

Density = Mass / Volume

Hence, Volume = Mass / Density

= 3000 / 8900 = 30 / 89

= 0.34 m^3

1.5 Measuring larger distances

Normally, we use centimetre, metre and kilometre to express the distances that we measure in our day to day life. But, for space research, astronomers need to measure very long distances such as the distance between the earth and a star or the distance between two stars. To express these distances, we shall learn about two such units, namely,

i. Astronomical unit
ii. Light year

1.5.1 Astronomical Unit

We all know that the earth revolves around the sun in an elliptical orbit. Hence, the distance between the sun and the earth varies every day. When the earth is in its perihelion position (the position when the distance between the Earth and the Sun is short), the distance between

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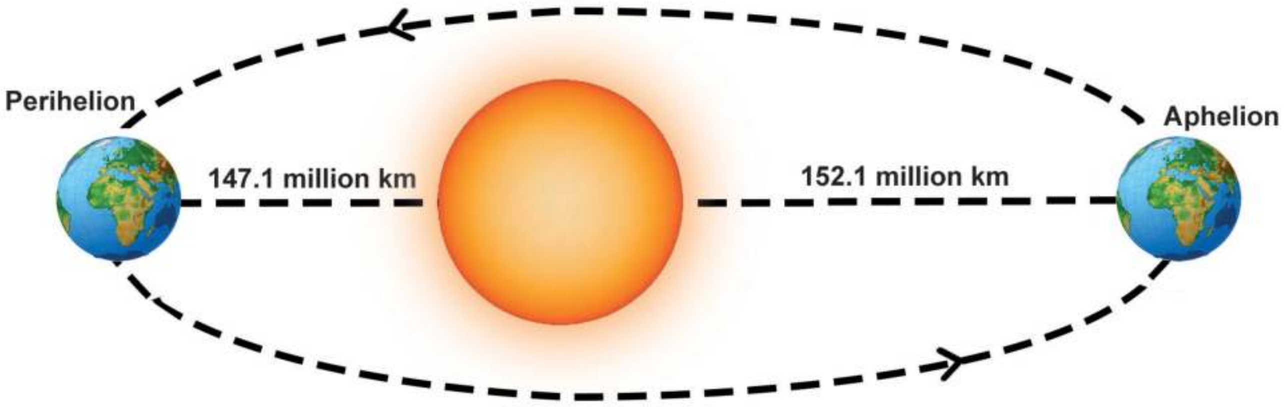

Perihelion and Aphelion position of Earth

the earth and the sun is about 147.1 million kilometre. When the earth is in its aphelion position, (the position when the distance between Earth and the Sun is the largest) the distance is 152.1 million kilometre. The average distance between the earth and the sun is about 149.6 million kilometre. This average distance is taken as one astronomical unit. Neptune is 30 AU away from the Sun. It means it is thirty times farther than the Earth.

One astronomical unit is defined as the average distance between the earth and the sun.

1 AU = 149.6 million km

$= 149.6 \times 10^6$ km $= 1.496 \times 10^{11}$ m.

1.5.2 Light year

The nearest star to our solar system is Proxima Centauri. It is at a distance of 2,68,770 AU. We can note here that using AU for measuring distances of stars would be unwieldy. Therefore, astronomers use a special unit, called 'light year', for measuring the distance in deep space. We have learnt that the speed of light in vacuum is 3×10^8 m/s. This means that light travels a distance of 3×10^8 m in one second. In a year (non-leap), there are 365 days. Each day has 24 hours, each hour has 60 minutes and each minute has 60 seconds.

Thus, the total number of seconds in one year

$= 365 \times 24 \times 60 \times 60$

$= 3.153 \times 10^7$ second

If light travels at a distance of 3×10^8 m in one second, then the distance travelled by light in one year $= 3 \times 10^8 \times 3.153 \times 10^7 = 9.46 \times 10^{15}$ m. This distance is known as one light year.

One light year is defined as the distance travelled by light in vacuum during the period of one year.

1 Light year $= 9.46 \times 10^{15}$ m.

In terms of light year, Proxima Centauri is at 4.22 light-years from Earth and the Solar System. The Earth is located about 25,000 light-years away from the galactic centre.

Points to Remember

- A set of physical quantities which cannot be expressed in terms of any other quantities are known as fundamental quantities. Their corresponding units are called fundamental units.
- The physical quantities which can be obtained by mathematically combining (i.e., multiplying and dividing) the fundamental quantities are known as

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derived quantities. Their corresponding units are called derived units.

- ❖ The area of a figure is the region covered by the boundary of the figure. Its SI unit is square metre or m^2.
- ❖ The area of irregularly shaped figures can be calculated with the help of a graph sheet.
- ❖ The amount of space occupied by a three dimensional object is known as its volume. The SI unit of volume is cubic metre or m^3.
- ❖ The volume of liquids are expressed in terms of litre. One litre = 1000 cc.
- ❖ The maximum volume of a liquid that a container can is known as the capacity of the container.
- ❖ Density of a substance is defined as the mass of the substance contained in unit volume (1 m^3).
- ❖ SI unit of density is kg/m^3. The CGS unit of density is g/cm^3. $1 g/cm^3 = 10^3 kg/m^3$.
- ❖ The materials with higher density are called denser materials and the materials with lower density are called rarer materials.
- ❖ If the density of a solid is higher than that of a liquid, it sinks in that liquid. If the density of a solid is lower than that of a liquid, it floats in that liquid.
- ❖ Density = Mass / Volume

  Mass = Density × Volume

  Volume = Mass / Density
- ❖ One astronomical unit is defined as the average distance between the Earth and the Sun. 1 AU = 149.6×10^6 km = 1.496×10^{11} m.
- ❖ One light year is defined as the distance travelled by light in vacuum during the period of one year. 1 Light year = 9.46×10^{15} m.

Evaluation

I. Choose the best answer.

1. Which of the following is a derived quantity?
   a) mass b) time
   c) area d) length
2. Which of the following is correct?
   a) 1L = 1cc b) 1L = 10 cc
   c) 1L = 100 cc d) 1L = 1000 cc
3. SI unit of density is
   a) kg/m^2 b) kg/m^3 c) kg/m d) g/m^3
4. Two spheres have mass and volume in the ratio 2:1. The ratio of their density is
   a) 1:2 b) 2:1 c) 4:1 d) 1:4
5. Light year is the unit of
   a) distance b) time
   c) density d) Both length and time

II. Fill in the blanks.

1. Volume of irregularly shaped objects are measured using the law of ______________.
2. One cubic metre is equal to ______________ cubic centimetre.
3. Density of mercury is ________________.
4. One astronomical unit is equal to ________.
5. The area of a leaf can be measured using a __________________________.

III. State true or false. If false, correct the statement.

1. The region covered by the boundary of a plane figure is called its volume.

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[redacted]

2. Volume of liquids can be found using measuring containers.
3. Water is denser than kerosene.
4. A ball of iron floats in mercury.
5. A substance which contains less number of molecules per unit volume is said to be denser.

IV. Match the following items.

a.

1. Area	a. light year
2. Distance	b. m^3
3. Density	c. m^2
4. Volume	d. kg
5. Mass	e. kg / m^3

b.

1. Area	a. g / cm^3
2. Length	b. measuring jar
3. Density	c. amount of a substance
4. Volume	d. rope
5. Mass	e. plane figures

V. Arrange the following in correct sequence.

1. 1L, 100 cc, 10 L, 10 cc
2. Copper, Aluminium, Gold, Iron

VI. Use the analogy to fill in the blank

1. Area : m^2 :: Volume : __________
2. Liquid : Litre :: Solid : __________
3. Water : Kerosene :: ________ : Aluminium

VII. Consider the following statements and choose the correct option.

1. **Assertion:** Volume of a stone is found using a measuring cylinder.
   Reason: Stone is an irregularly shaped object.
2. **Assertion:** Wood floats in water.
   Reason: Water is a transparent liquid.
3. **Assertion:** Iron ball sinks in water.
   Reason: Water is denser than iron.
   a. Both assertion and reason are true and reason is the correct explanation of assertion.
   b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
   c. Assertion is true but reason is false.
   d. Assertion is false but reason is true.

VIII. Answer very briefly.

1. Name some of the derived quantities.
2. Give the value of one light year.
3. Write down the formula used to find the volume of a cylinder.
4. Give the formula to find the density of objects.
5. Name the liquid in which iron ball sinks.
6. Name the units used to measure the distance between celestial objects.
7. What is the density of gold?

IX. Answer briefly.

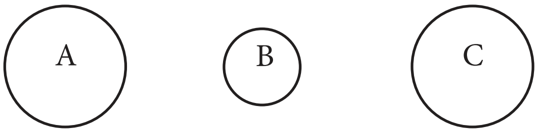
1. What are derived quantities?
2. Distinguish between the volume of liquid and capacity of a container.
3. Define the density of objects.
4. What is one light year?
5. Define - Astronomical unit.

X. Answer in detail.

1. Describe the graphical method to find the area of an irregularly shaped plane figure.
2. How will you determine the density of a stone using a measuring jar?

XI. Questions based on Higher Order Thinking Skills:

There are three spheres A, B, C as shown below. Sphere A and B are made of same material. Sphere C is made of a different material. Spheres A and C have equal radii. The radius of sphere B is half that of A. Density of A is double that of C.



Now answer the following questions.

i. Find the ratio of masses of spheres A and B.

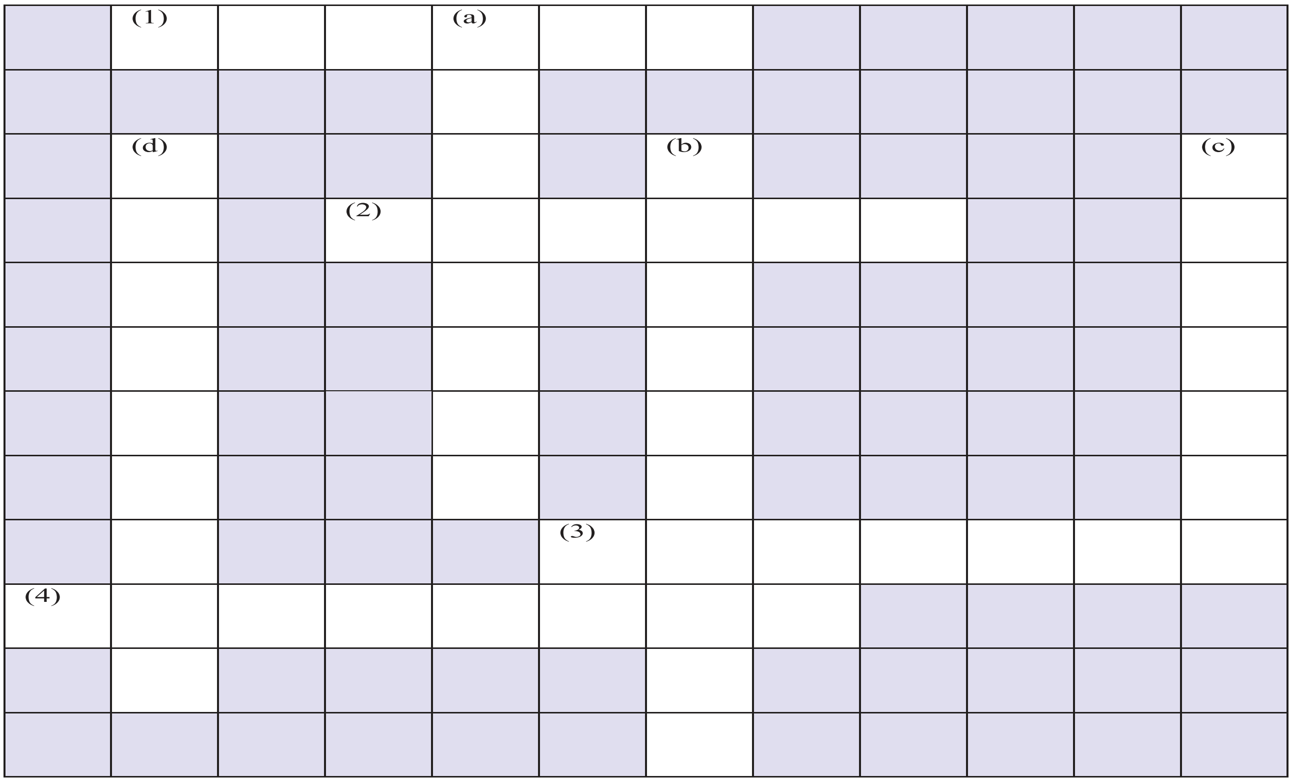
ii. Find the ratio of volumes of spheres A and B.

iii. Find the ratio of masses of spheres A and C.

XII. Numerical problems:

1. A circular disc has a radius 10 cm. Find the area of the disc in m^2 (Use $\pi = 3.14$).
2. The dimension of a school playground is 800 m × 500 m. Find the area of the ground.
3. Two spheres of same size are made from copper and iron respectively. Find the ratio between their masses (Density of copper is 8,900 kg/m^3 and iron is 7,800 kg/m^3).
4. A liquid having a mass of 250 g fills a space of 1000 cc. Find the density of the liquid.
5. A sphere of radius 1cm is made from silver. If the mass of the sphere is 33g, find the density of silver (Take $\pi = 3.14$).

XIII. Cross word puzzle.



Clues – Across

1. SI unit of temperature; 2. A derived quantity; 3. Mass per unit volume; 4. Maximum volume of liquid a container can hold

Clues – Down

a. A derived quantity b. SI unit of volume c. A liquid denser than iron d. A unit of length used to measure very long distances

Answer

1. Kelvin; 2. Volume; 3. Density; 4. Capacity a. Velocity; b. Cubic metre; c. Mercury; d. Lightyear

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ICT CORNER

Measurement

Let's know about the effects of mass and volume on density.

PROCEDURE :

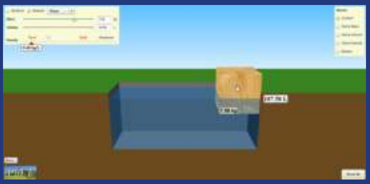
Step 1: Use the URL or scan the QR code to open the activity page.

Step 2: Select the options at top right side window to customize

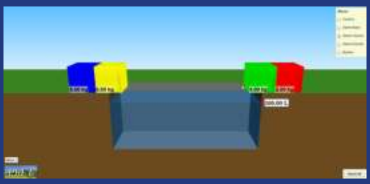
Step 3: Move the sliders on the top left-side window to change the Material and Mass, Volume. Now see the effects of mass and volume on density.

Step 4: Click 'Reset all' button to refresh

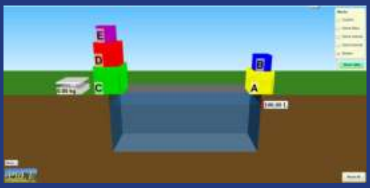
Step 1



Step 2



Step 3



Step 4

Measurement URL:

https://phet.colorado.edu/en/simulation/density (or) scan the QR Code

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.

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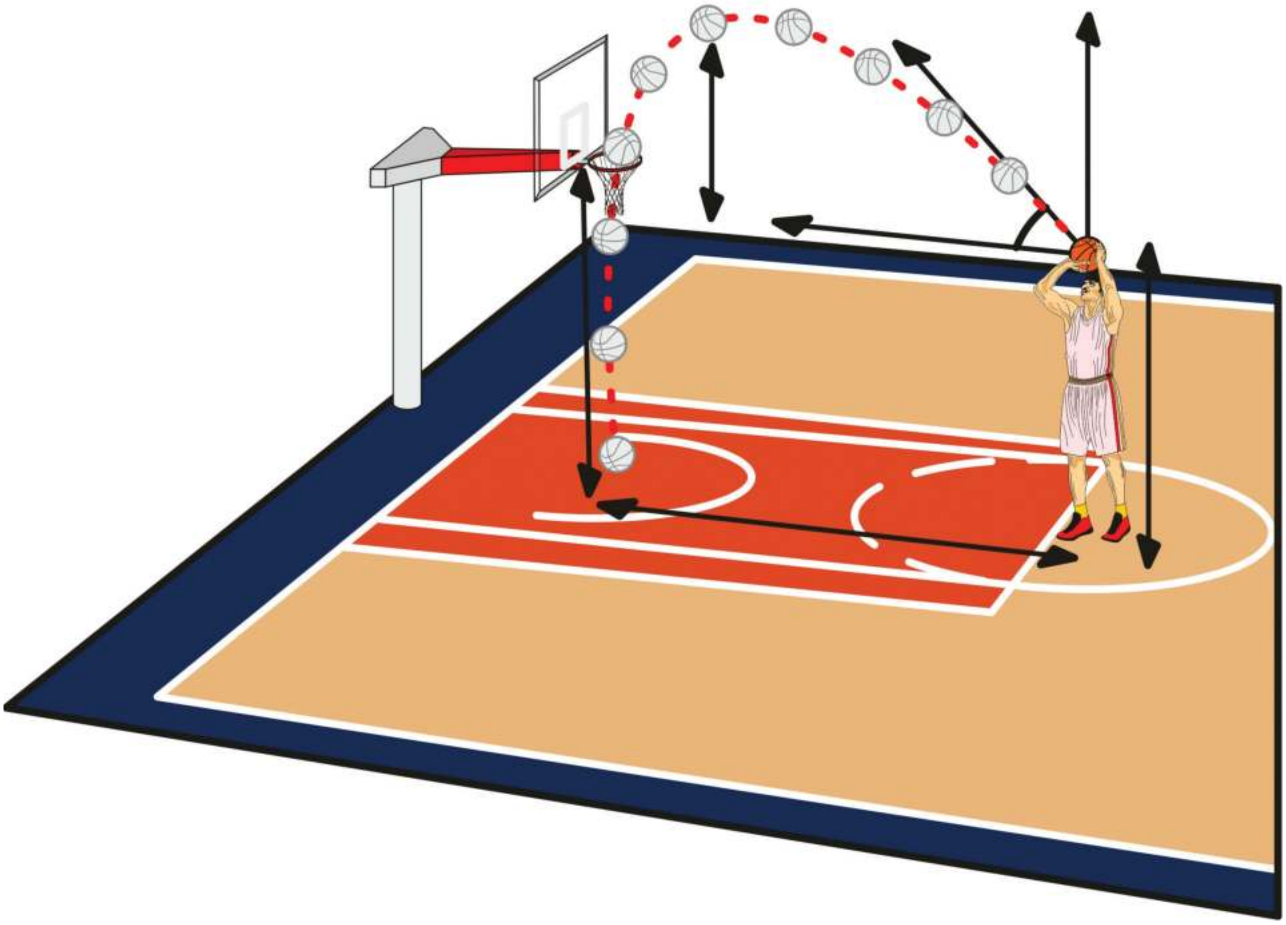
Unit 2

Force and Motion



Learning Objectives

After studying this unit, students will be able to:

- define distance and displacement.
- differentiate distance and displacement.
- define speed, velocity and acceleration.
- differentiate speed and velocity.
- draw and explain distance - time and velocity - time graphs.
- measure and calculate the speed of moving objects.
- know the day to day uses of centre of gravity and stability.

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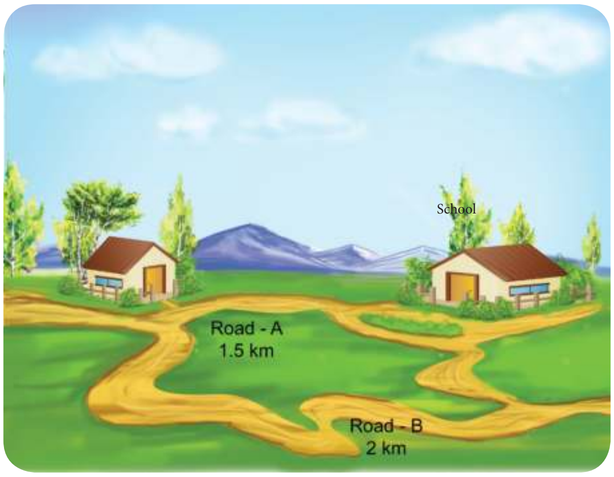
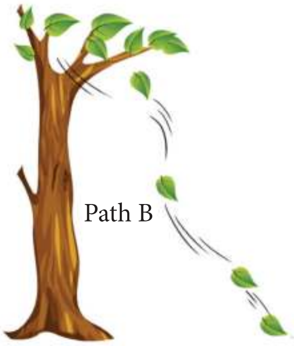
Introduction

Look at the picture given below. Kavitha can reach her school in two ways, as shown in the picture. Can you tell, by choosing which path she could reach the school early?



In the picture given below, you can see leaf falling from a tree. In which path the leaf will reach the ground first?

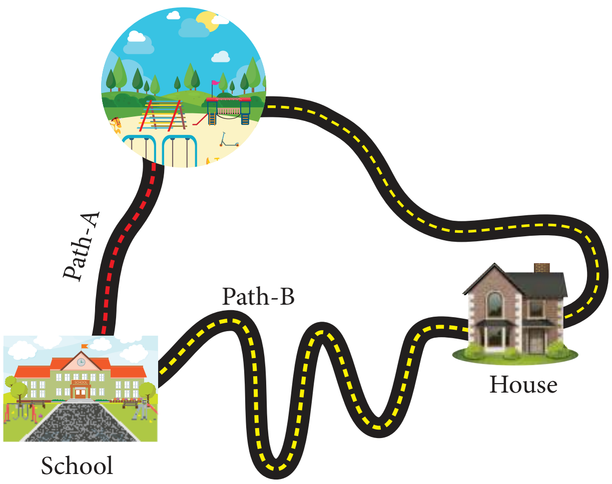
Path of the leaf, when there is no wind.



Path of the leaf when there is wind.

Uma and Priya are friends studying in the same school. After school hours, they go to the nearby playground, play games and return back home. One day Uma told that she would reach the playground after visiting her grandmother's house. The paths which they took to reach the playground is shown here.

Take a twine and measure the length of the two paths (A and B). Which is the longest path among the two?



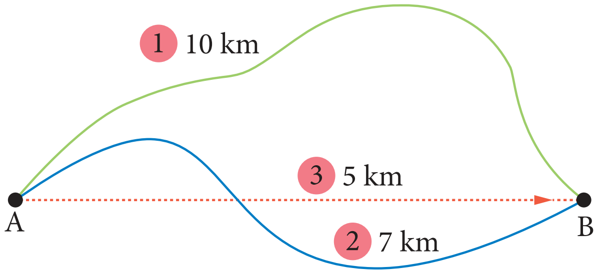
From the above examples, we could conclude that when an object travels from one place to another, it will reach faster if it travels along the straight line path. The straight line path is the shortest distance between two points.

In this lesson we are going to study about distance and displacement, speed and velocity, acceleration, distance - time graph, velocity - time graph, centre of gravity and stability.

2.1 Distance and Displacement

The total length of a path taken by an object to reach one place from another place is called distance. The shortest distance from the initial position to the final position of an object is called displacement. Both distance and displacement possess the same unit. The SI unit distance and displacement is metre (m).

The figure given below shows the motion of a person between two places A and B.



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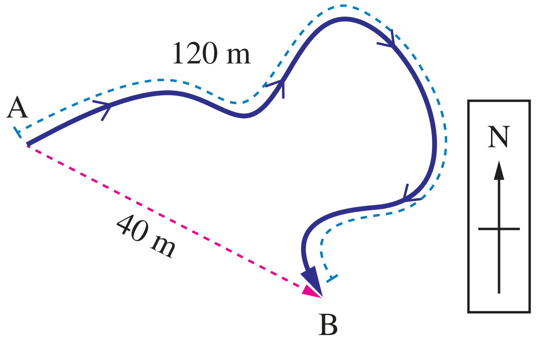
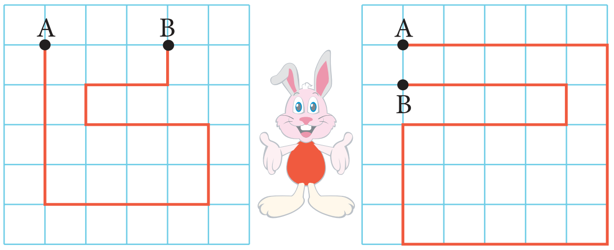
He travels 10 km along the first path. Along the second path, he travels 7 km. The distance between A and B in the case of first path is 10 km. In the case of second path, the distance is 7 km. The shortest distance between the two places is 5 km which is represented by the third path. So, the displacement is 5 km (In east direction).

The path of an object moving from point A to point B is shown in the figure. Total distance travelled by the object is 120 m. The displacement of the object is 40 m (south - east direction).



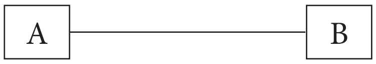
The path in which a rabbit ran is shown in the figure below. Let us consider that each square is in an unit of one square meter. The rabbit starts from point A and reaches the point B. Find the distance and displacement of it in the two figures. When will the distance and displacement be equal? (The starting point and the finishing point should be different).



Distance ____________ Displacement ____________

Distance ____________ Displacement ____________

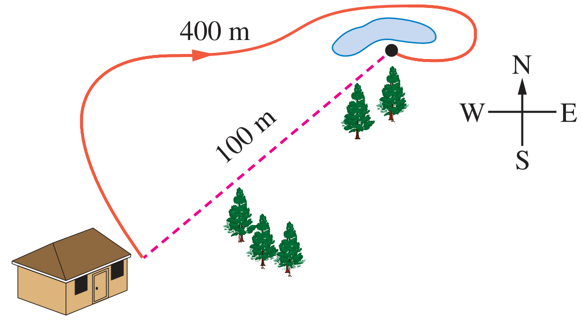
When we represent the displacement, we use a positive or negative sign depending on the direction in which it travels.



Let us consider the point A as the starting point. While the object moves from A to B the displacement is considered to be positive and it is negative, when it travels from B to A.

Subha goes to the nearby playground from her home. Look at the picture and answer the following questions.

1. What is the distance she travelled?
2. What is her displacement?



Can you answer the following questions?

- ❖ The distance travelled by an object is 15 km and its displacement is 15 km. What do you infer from this?
- ❖ The distance travelled by a person is 30 km and his displacement is 0 km. What do you infer from this?

DO YOU KNOW?

Nautical mile

Nautical mile is the unit for measuring the distance in the field of aviation and sea transportation. One nautical mile is 1.852 km.

The unit for measuring the speed of aeroplanes and ships is knot. It means that they travel one nautical mile in one hour.

2.2 Speed - Velocity

2.2.1 Speed

In sixth standard you have already studied about speed in detail. Speed is the rate of change of distance.

Speed = Distance / Time

The unit of speed is metre/second (m/s).

We can classify speed into two types.

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Uniform speed

If a body in motion covers equal distances in equal intervals of time, then the body is said to be in uniform speed.

Non- uniform speed

If a body covers unequal distances in equal intervals of time, the body is said to be in non-uniform speed.

$$\text{Average Speed} = \frac{\text{Total distance travelled}}{\text{Time taken to travel the distance}}$$

> **DO YOU KNOW?**
>
> **1 km/h = 5/18 m/s**
>
> How we got this ?
>
> 1 km = 1000 m; 1 h = 3600 s
>
> 1 km / h = 1000 m / 3600 s = 5/ 18 m /s

> **DO YOU KNOW?**
>
> **Know the speed**

Tortoise	0.1 m/s
Person walking	1.4 m/s
Falling raindrop	9-10 m/s
Cat running	14 m/s
Cycling	20-25 km/h
Cheetah running	31 m/s
Bowling speed of fast bowlers	90-100 miles /h
Badminton smash	80-90 m/s
Passenger jet	180 m/s
Rocket	5200 m/s

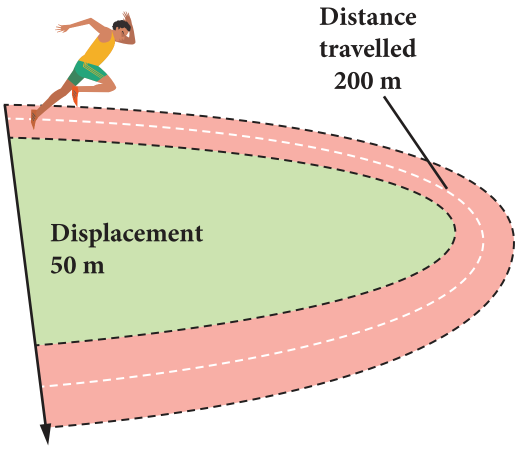
2.2.2 Velocity

Velocity is the rate of change in displacement.

Velocity (v) = Displacement / Time

SI unit of velocity is metre / second (m/s).

Look at the figure. An athlete takes 25 s to complete a 200 m sprint event. Find her speed and velocity.



$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{200}{25} = 8 \text{ m/s}$$

$$\text{Velocity} = \frac{\text{Displacement}}{\text{Time}} = \frac{50}{25} = 2 \text{ m/s}$$

Uniform velocity

A body is said to have uniform velocity, if it covers equal displacement at equal intervals of time in the same direction. **E.g.** Light travels through vacuum.

Non-uniform velocity

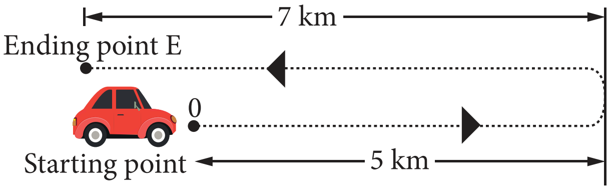
If either speed or direction changes, the velocity is non-uniform. **E.g.** A train starting and moving out of the station.

Average velocity

If the total displacement of an object is divided by the total time taken by the object we get the average velocity.

$$\text{Average velocity} = \frac{\text{Total displacement}}{\text{Total time taken}}$$

In the figure given below, a car travels 5 km due east and makes a U – turn to travel another 7 km. If the time taken for the whole journey is 0.2 h, calculate the average velocity of the car.



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Average velocity = Total displacement/Time taken. (Taking the direction due east of point O as positive)

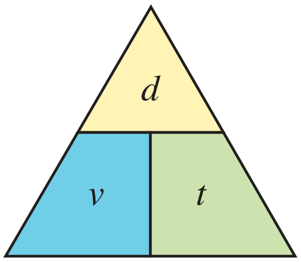
Average velocity = (5 – 7) / 0.2

= –2 / 0.2

= –10 km/h or – 10 × 5/18

= – 25/9 = –0.28 m/s

The triangle method can help you to recall the relationship between velocity (v), displacement (d), and time(t).



v = d / t , t = d / v, d = v × t

Answer the following questions.

- Calculate the velocity of a car travelling with a uniform velocity covering 100 m in 4 seconds.
- Usain Bolt covers 100 m in 9.58 seconds. Calculate his speed. If Usain Bolt competes with a Cheetah which is running at a speed of 30 m/s, who will be the winner?
- You are walking along east direction covering a distance of 4 m, then 2 m towards south, then 4 m towards west and at last 2 m towards north. You cover the total distance in 21 seconds. What is your average speed and average velocity?

2.3 Acceleration

Acceleration is the rate of change of velocity. In other words, if a body changes its speed or direction then it is said to be accelerated.

$$\text{Acceleration} = \frac{\text{Change in velocity}}{\text{Time}}$$

$$= \frac{\text{Final velocity (v)} - \text{Initial velocity (u)}}{\text{Time}}$$

$$a = \frac{(v - u)}{t}$$

SI unit of acceleration is m/s^2

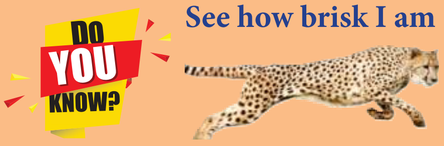
A car at rest starts to travel in a straight line path. It reaches a velocity of 12 m/s in 4 s . What is its acceleration, assuming that it accelerates uniformly?

Initial velocity, u = 0 m/s (Since the car starts from rest)

Final velocity (v) = 12 m /s

Time taken (t) = 4 s

$$\text{Acceleration (a)} = \frac{(v-u)}{t} = \frac{(12-0)}{4} = 3\ m/s^2$$

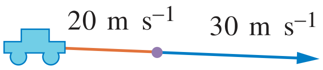


See how brisk I am !

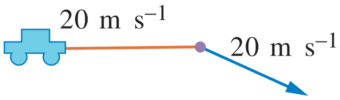
My name is cheetah. I can run at great speed. Do you know what my speed is? It is 25 m/s to 30 m/s. My speed changes from 0 to 20 m/s in 2 second. See how good my acceleration is ! Can you calculate it?

2.3.1 Positive acceleration

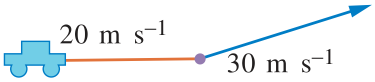
If the velocity of an object increases with respect to time, then the object is said to be in positive acceleration.



(a) Change in speed



(b) Change in direction



(c) Change in both speed and direction

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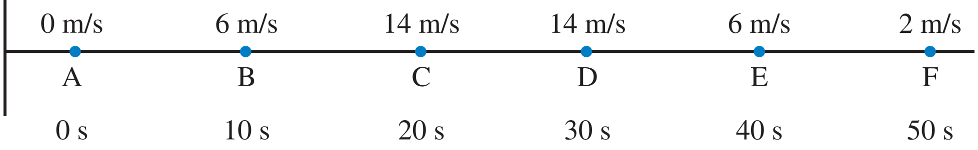
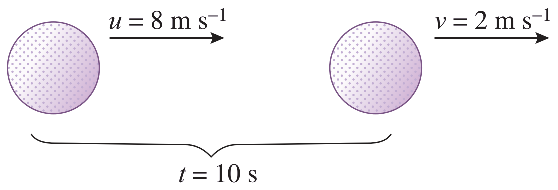
The velocity of a train at different times is given in the figure. Analyse this and complete the table .



The distance travelled by train	Initial velocity (u) m/s	Final velocity (v) m/s	Change in velocity (v – u) m/s	Time taken (t) s	Acceleration = Change in velocity / Time a = (v – u) / t m / s^2
A-B	0	6	6	10	0.6
B-C					
C-D					
D-E					
E-F					

2.3.2 Negative acceleration or Deceleration or Retardation

If the velocity of an object decreases with respect to time, then the object is said to be in negative acceleration or deceleration or retardation.



The velocity of a golf ball rolling in a straight line changes from 8 m/s to 2 m/s in 10 s. What is its deceleration, assuming that it is decelerating uniformly ?

Initial velocity (u) = 8 m/s

Final velocity (v) = 2 m/s

Time taken(t) = 10 s

$$\text{Acceleration (a)} = \frac{(v-u)}{t} = \frac{(2-8)}{10} = -0.6 \text{m/s}^2$$

The deceleration is –0.6 m/s^2

2.3.3 Uniform acceleration

An object undergoes uniform acceleration when the change (increase or decrease) in its velocity for every unit of time is the same.

The table given below shows the uniform acceleration of a bus.

Time (s)	1	2	3	4	5
Velocity (m/s)	20+20	40+20	60+20	80+20	100 + 20
	(acceleration)				
Velocity (m/s)	100–20	80-20	60-20	40-20	20-20
	(deceleration)				

When the velocity of the object is increasing by 20 m/s the acceleration is 20 m/s^2. When the velocity of the object is decreasing by 20 m/s the deceleration is 20 m/s^2.

2.3.4 Non – uniform acceleration

An object undergoes non–uniform acceleration if the change in its velocity for every unit of time is not the same.

Time (s)	0	1	2	3	4	5
Velocity (m/s)	0	10	40	60	70	50
Change in Velocity (m/s)	0	10	30	20	10	20

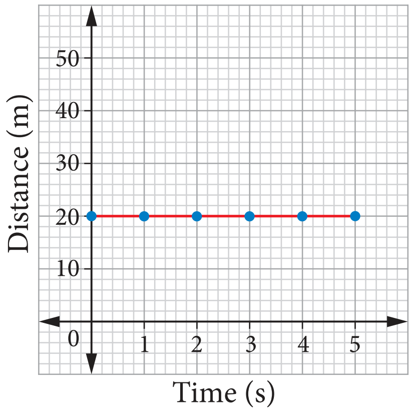
Note here that the change in velocity is not the same for every second. Thus, the moving object is undergoing non-uniform acceleration.

2.4 Distance – Time Graphs

A car travelling along a straight line away from the starting point O is shown in the figure. The distance of the car is measured for every second. The distance and time are recorded and a graph is plotted using the data. The results for four possible journeys are shown below.

a. Car at rest

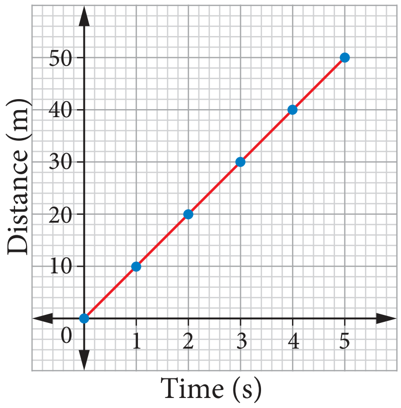
Time (s)	0	1	2	3	4	5
Distance (m)	20	20	20	20	20	20



The graph has zero gradient. i.e. the distance is constant for every second. Thus, the car is at rest.

b. Car travelling at uniform speed of 10ms^{-1}

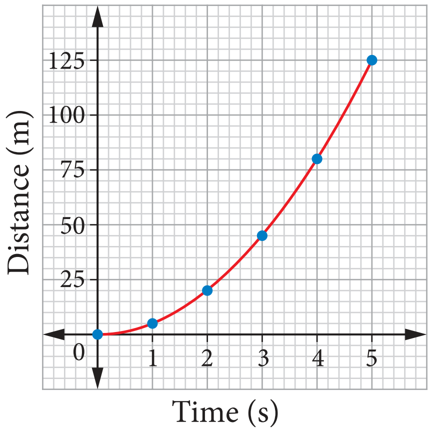
Time (s)	0	1	2	3	4	5
Distance (m)	0	10	20	30	40	50



The graph has constant gradient. The distance increases 10 m in every second. Thus, the car moves with uniform speed.

c. Car travelling at increasing speed

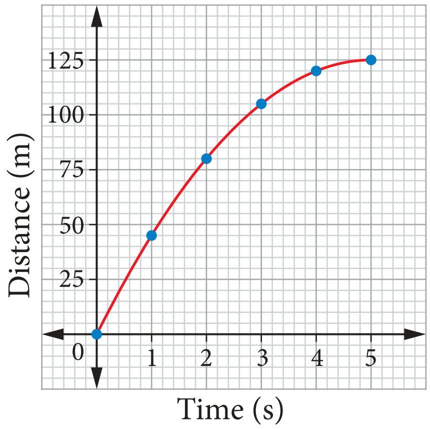
Time (s)	0	1	2	3	4	5
Distance (m)	0	5	20	45	80	125



The graph has an increasing gradient, i.e. That is, the speed increases.

d. Car travelling at decreasing speed

Time (s)	0	1	2	3	4	5
Distance (m)	0	45	80	105	120	125



The graph has a decreasing gradient. That is, the speed decreases.

2.5 Speed – Time Graphs

Let us consider a bus travelling from Thanjavur to Trichy. The speed of the bus is measured for every second. The speed and time are recorded and a graph is plotted using the data. It is known as speed-time graph. The results for four possible journeys are shown.

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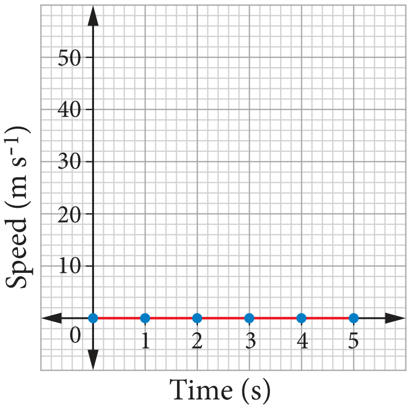
a. Bus at rest

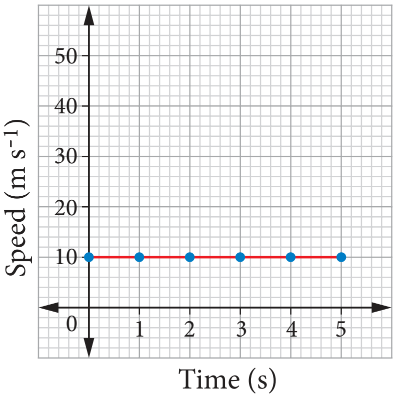
Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	0	0	0	0	0	0



The speed of the bus remains at 0 ms^{-1}. So, the bus has zero acceleration.

b. Bus travelling at uniform speed of ms^{-1}

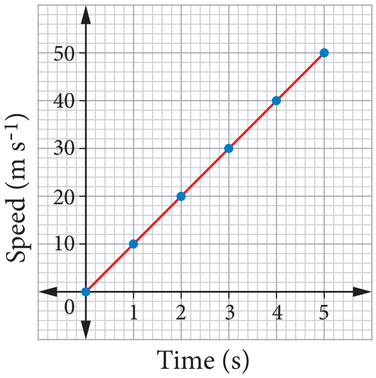
Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	10	10	10	10	10	10



The speed of the bus remains at 10 ms^{-1}. Here, slope of the line is zero. So, the bus has zero acceleration.

c. Bus travelling uniform acceleration

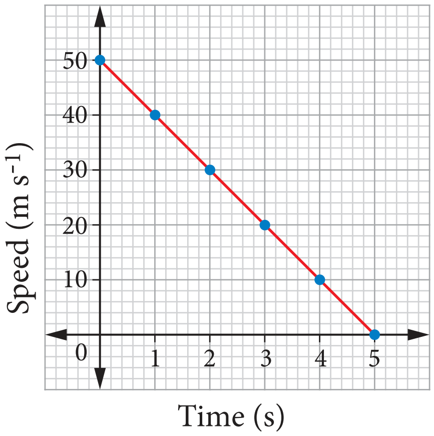
Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	10	10	20	30	40	50



The speed of the bus increases by 10 ms^{-1} every second. Hence, the graph has a positive and constant gradient, and the acceleration is constant.

d. Bus travelling uniform deceleration

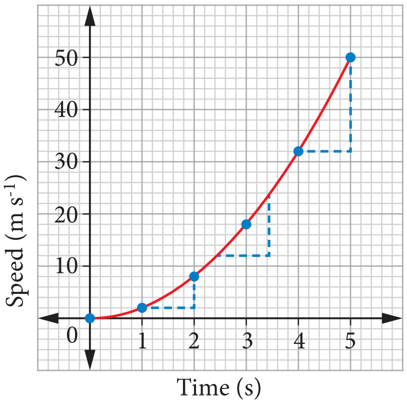
Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	50	40	30	20	10	0



The speed of the bus decreases by 10 ms^{-1} very second. Hence, the graph has a negative and constant gradient and the acceleration is negative and constant.

e. Bus travelling with increasing acceleration (Non-uniform acceleration)

Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	10	2	8	18	32	50



The speed of the bus is increasing with time. Hence, the graph has a positive and increasing gradient and the acceleration increases.

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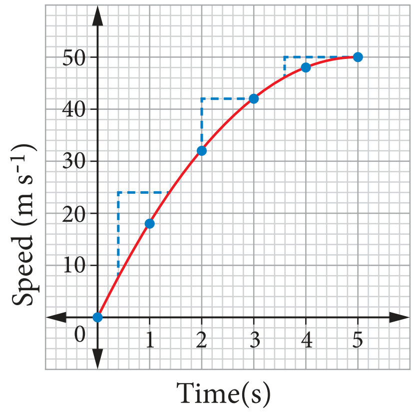
f. Bus travelling with decreasing acceleration (non-uniform acceleration)

Time (s)	0	1	2	3	4	5
Speed (ms^{-1})	10	18	32	42	48	50

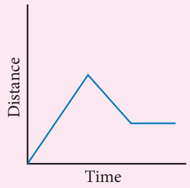


The speed is decreasing with time. Hence, the graph has a positive and decreasing gradient, and the acceleration decreases.

2.5.1 Comparison between Distance – Time and Speed – Time Graphs

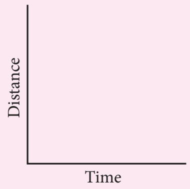
The Speed – Time graphs and Distance – Time graphs may look very similar. But, they give different information. We can differentiate them by looking at the labels.

Graph and Story



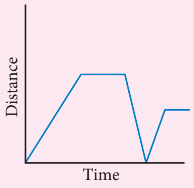
Raju began walking to his school. Suddenly he remembered that he forgot his pen and walked back home. But he stopped suddenly when he heard a noise.

Draw a graph for the given story



Rani was waiting for her mother for some time. When she saw her mother, she ran out of her home hugged her and stood there for a while.

Imagine and write a story on your own for the given graph?



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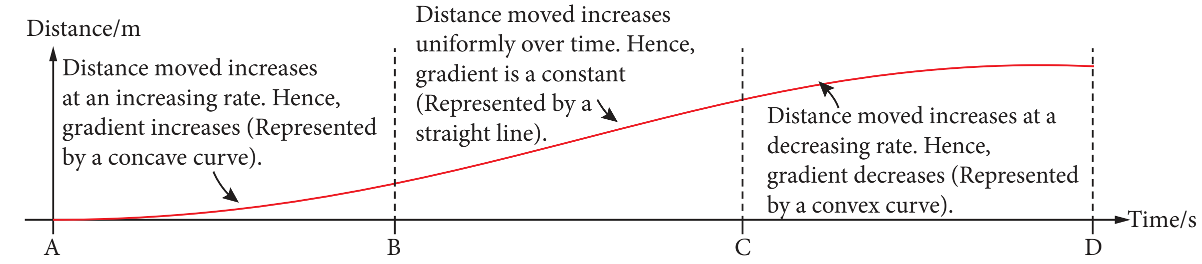
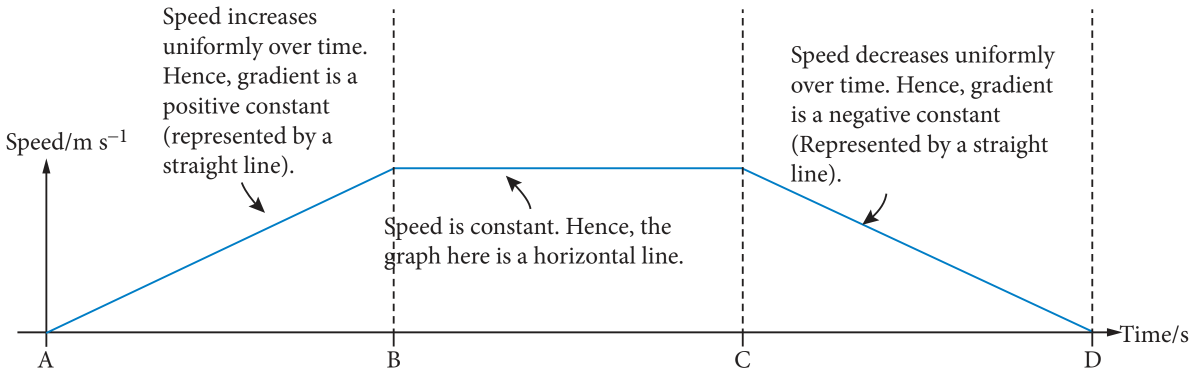
From A to B	From B to C	From C to D
Car accelerates uniformly from rest.	Car moves at constant speed.	Car decelerates uniformly to a stop.

Distance–Time Graph



Speed–Time Graph



2.6 Centre of Gravity

Try to balance a cardboard on your finger tip. What do you observe? You can notice that there is only one point at which the cardboard is balanced. The point at which the cardboard is balanced is called the centre of gravity of the cardboard.

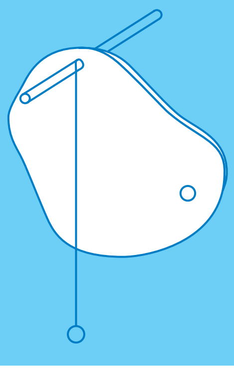
The centre of gravity of an object is the point through which the entire weight of the object appears to act. How do we find the centre of gravity of an object ?

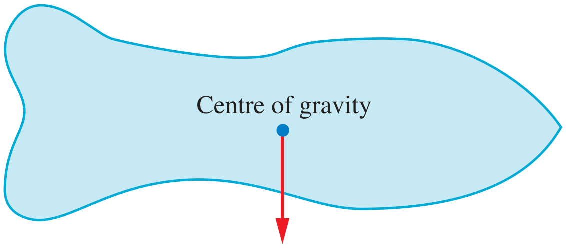
ACTIVITY 1

What about irregular shaped objects ?

Apparatus: Irregularly shaped card, string, pendulum bob, stand

1. Make three holes in the lamina.
2. Suspend the lamina from the optical pin through one of the holes as shown in figure.
3. Suspend the plumbline from the pin and mark the position of the plumbline on the lamina.
4. Draw lines on the lamina representing the positions of the plumbline.
5. Repeat the above steps for the other holes.
6. Label the intersection of the three lines as X, the position of the centre of gravity of the lamina.

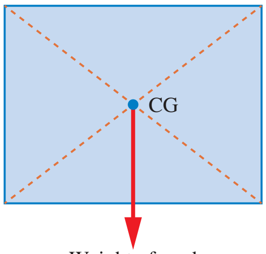




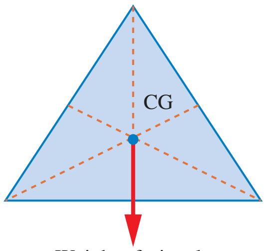
Total pull of the earth (weight) appears to act through the centre of gravity

2.6.1 Centre of gravity of regular – shaped objects

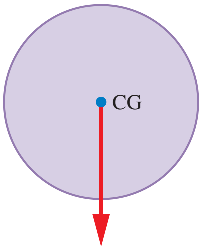
Generally the centre of gravity of the geometrical shaped objects lie on the geometric centre of the object.



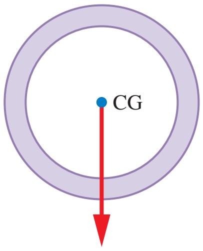
Weight of card



Weight of triangle



Weight of disc



Weight of ring

The ruler is in equilibrium when supported at its centre of gravity. For a regular object such as a uniform meter ruler, the centre of gravity is at the centre of the object. When the object is supported at that point, it will be balanced. If it is supported at any other point, it will topple.

2.7 Stability

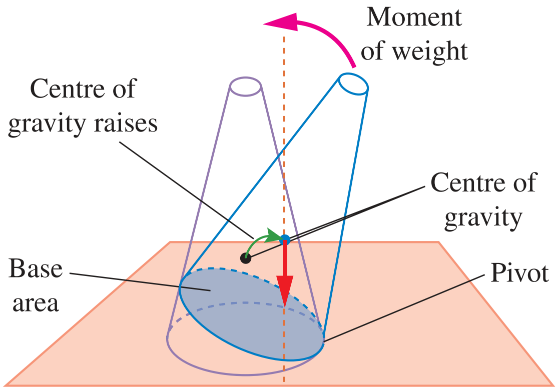
Stability is a measure of the body's ability to maintain its original position. Three types of stability are:

a. Stable equilibrium
b. Unstable equilibrium
c. Neutral equilibrium

Let us demonstrate them by taking a frustum.

Stable Equilibrium

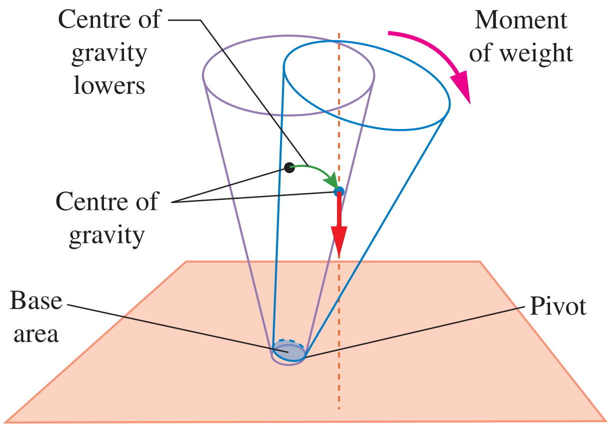
In stable equilibrium, the frustum can be tilted through quite a big angle without toppling.



Its centre of gravity is raised when it is displaced. The vertical line through its centre of gravity still falls within its base. So, it can return to its original position.

Unstable Equilibrium

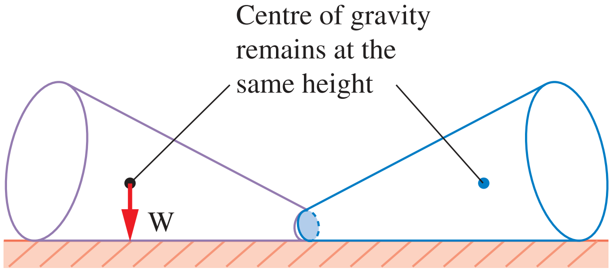
In this equilibrium, the frustum will topple with the slightest tilting. Its centre of gravity is lowered when it is displaced.



Here, the vertical line through its centre of gravity falls outside its base. So, it will not come back to its position.

Neutral Equilibrium

It causes frustum to topple. The frustum will roll about but does not topple. Its centre of gravity remains at the same height when it is displaced. The body will stay at any position to which it has been displaced.



2.7.1 Condition for Stability

Stability can be increased by the following ways.

- Lowering its centre of gravity
- Increasing the area of its base
- A heavy base lowers the centre of gravity So, the object will be stable.
- A broad base makes the object more stable.

DO YOU KNOW?

The Thanjavur Doll

It is s type of traditional toy made in Thanjavur from terracotta material. The centre of gravity and the total weight of the doll is concentrated at its bottom most point, generating a dance-like continuous movement with slow oscillations.

2.7.2 Real Life Applications of Centre of Gravity

- In order to have stability, the luggage compartment of a tour bus is located at the bottom and not on the roof.
- Extra passengers are not allowed on the upper deck of a crowded double decker bus.

- Racing cars are built low and broad for stability.
- Table lamps and fans are designed with large heavy bases to make them stable.

Points to Remember

- ❖ The total length of a path taken by an object to reach one place from the another place is called distance.
- ❖ The shortest distance from the initial to the final position of an object.
- ❖ Acceleration is the rate of change in velocity. SI unit of acceleration is m/s^2.
- ❖ Velocity is the rate of change in displacement. SI unit of velocity is metre / second (m/s).
- ❖ The centre of gravity of an object is the point through which the entire weight of the object appears to act.
- ❖ Generally the centre of gravity of the geometrical shaped object lie on the geometric centre of the object.
- ❖ Stability is a measure of the body's ability to maintain its original position.
- ❖ The three types of stability are: stable equilibrium, unstable equilibrium, neutral equilibrium.

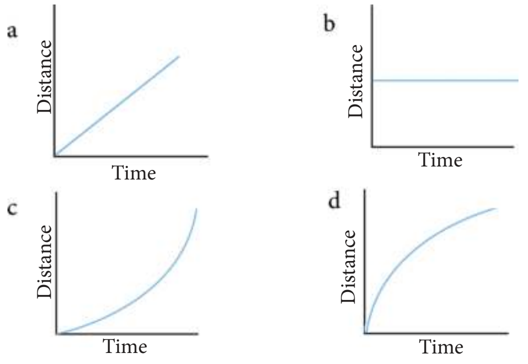
Evaluation

I. Choose the best answer.

1. A particle is moving in a circular path of radius *r*. The displacement after half a circle would be

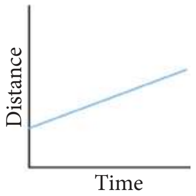
   a. Zero b. R c. 2 *r* d. *r* / 2

2. Which of the following figures represent uniform motion of a moving object correctly?



3. Suppose a boy is enjoying a ride on a merry go round which is moving with a constant speed of 10 m/s. It implies that the boy is
   a. at rest
   b. moving with no acceleration
   c. in accelerated motion
   d. moving with uniform velocity

4. From the given v-t graph it can be inferred that an object is
   a. in uniform motion b. at rest
   c. in non - uniform motion
   d. moving with uniform accelerations



5. How can we increase the stability of an object?
   a. Lowering the centre of gravity
   b. Raising the centre of gravity
   c. Increasing the height of the object
   d. Shortening the base of the object

II. Fill in the blanks.

1. The shortest distance between two places is ____________.
2. The rate of change of velocity is__________.

3. If the velocity of an object increases with respect to time, then the object is said to be in__________ acceleration.
4. The slope of the speed–time graph gives __________.
5. In __________ equilibrium, the centre of gravity remains at the same height when it is displaced.

III. Match the following.

Displacement	Knot
Light travelling through vacuum	Geometric centre
Speed of ship	Metre
Centre of gravity of geometrical shaped objects	Larger base area
Stability	Uniform velocity

IV. Analogy

1. Velocity : metre/second :: Acceleration : __________ .
2. Length of scale : metre :: Speed of aeroplane : __________ .
3. Displacement / Time : Velocity :: Speed / Time : __________ .

V. Answer very briefly.

1. Asher says all objects having uniform speed need not have uniform velocity. Give reason.
2. Saphira moves at a constant speed in the same direction. Rephrase the same sentence in fewer words using concepts related to motion.
3. Correct your friend who says that acceleration gives the idea of how fast the position changes.

VI. Answer briefly.

1. Show the shape of the distance – time graph for the motion in the following cases. a. A bus moving with a constant speed. b. A car parked on a road side.
2. Distinguish between speed and velocity.
3. What do you mean by constant acceleration?
4. What is centre of gravity ?

VII. Answer in detail.

1. Explain the types of stability with suitable examples.
2. Write about the experiment to find the centre of gravity of the irregularly shaped plate.

VIII. Numerical problems.

1. Geetha takes 15 minutes from her house to reach her school on a bicycle. If the bicycle has a speed of 2 m/s, calculate the distance between her house and the school.
2. A car starts from rest and it is travelling with a velocity of 20 m/s in 10 s. What is its acceleration?
3. A bus can accelerate with an acceleration of 1 m/s^2. Find the minimum time for the bus to attain the speed of 100 km/s from 50 km/s.

IX. Fill in the boxes.

S.No.	First Move	Seconde Move	Distance (m)	Displacement
1.	Move 4 metres east	Move 2 metres west	6	2 m east
2.	Move 4 metres north	Move 2 metres south		
3.	Move 2 metres east	Move 4 metres west		
4.	Move 5 metres east	Move 5 metres west		
5.	Move 5 metres south	Move 2 metres north		
6.	Move 10 metres west	Move 3 metres east		

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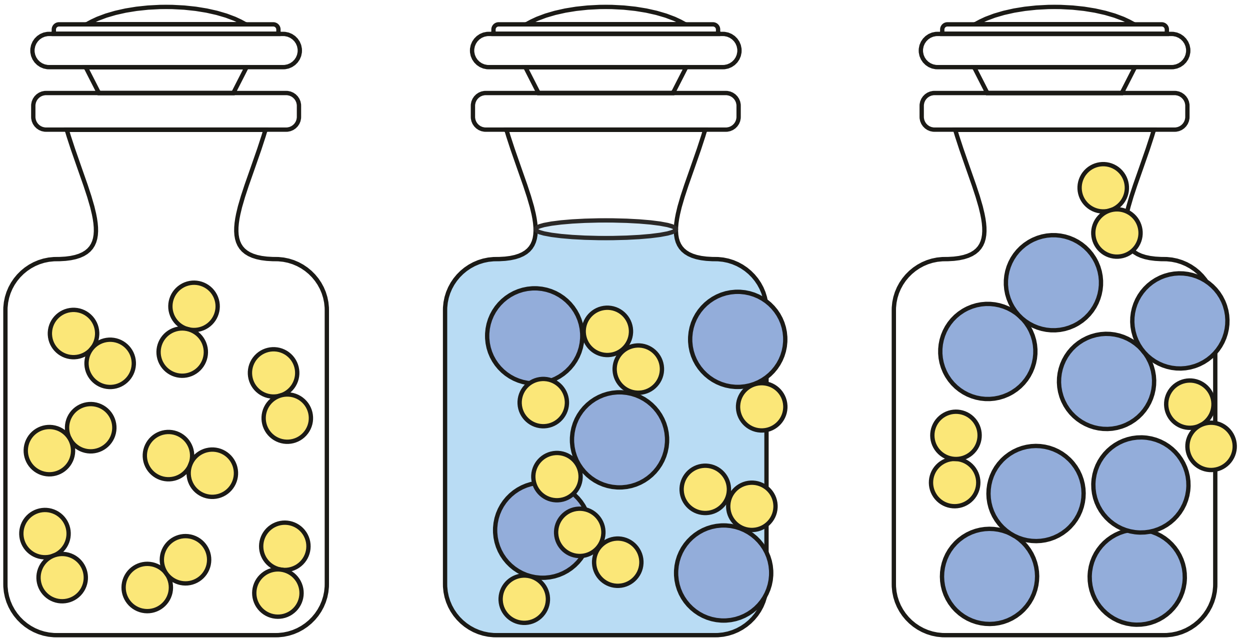
Unit 3

Matter Around Us



Element (Hydrogen) | Compound (Water) | Mixture (Hydrogen & Oxygen)

Learning Objectives

After studying this unit, students will be able to:

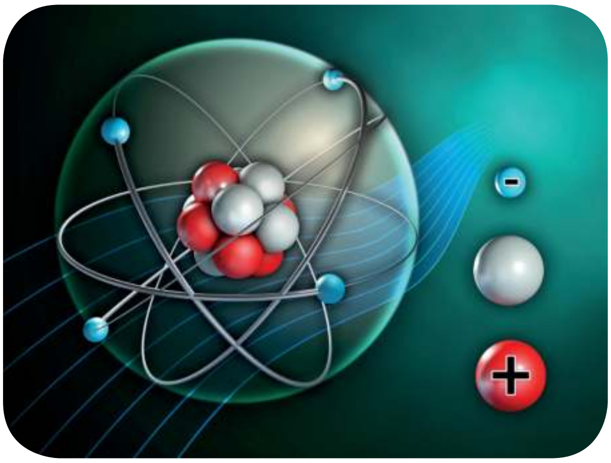
- ❖ know about the molecules of elements and compounds.
- ❖ write the symbols of common elements.
- ❖ calculate the atomicity of commonly used elements.
- ❖ know about the occurrence of elements and compounds in nature and human body / air.
- ❖ understand the effects of temperature on solid, liquid and gas.

Introduction

We know that everything that occupies space and has mass is called matter. Do you know what is matter is composed of? We have studied earlier that matter is composed of tiny little particles, which cannot be seen with naked eye. That particle is called atom. In this lesson, we will study about atoms, molecules, elements, compounds, chemical formulae and atomicity.

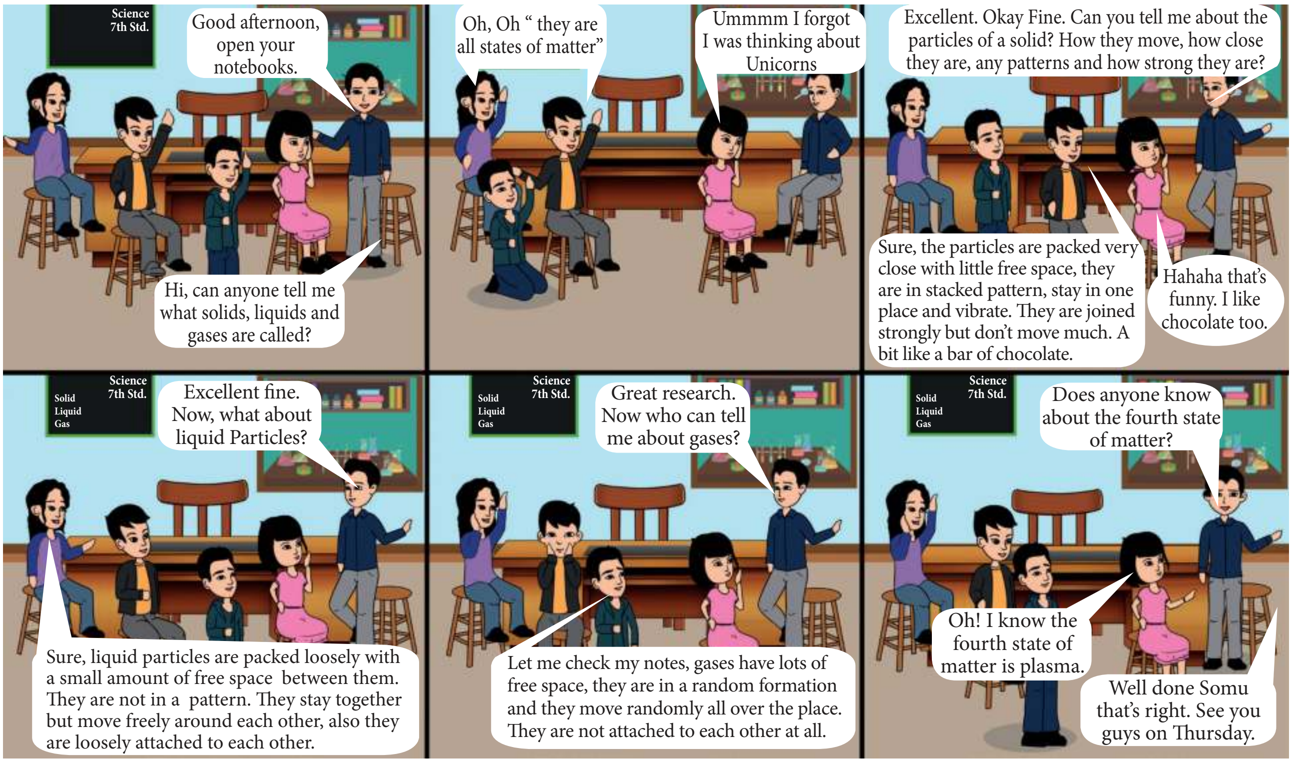
3.1 Atoms

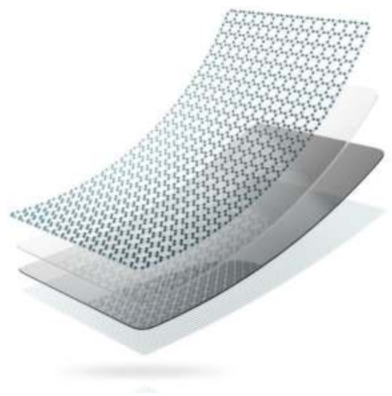
Graphite lead used in pencil is made up of an element called carbon. We can break graphite into smaller and smaller pieces. If we have a finer knife, we can break it even smaller. If we keep cutting the minuscule graphite into smaller and smaller particle, we will reach a point where we get the smallest constituent of graphite - carbon atom. If we break the carbon atom apart, the properties of carbon are exhibited. The smallest unit of an element that exhibits the properties of that element is called as 'atom'. All the matter is composed of tiny particles called atom. Water, rice and everything we see around is made up of atoms. An atom is the basic unit of a matter.



Structure of an atom

Even with the best of optical microscope we cannot see atoms. However, there are advanced instruments that help us to imagine the atoms on the surface of a material. For example, the following figure shows the image of the surface of silicon.





Surface of Silicon

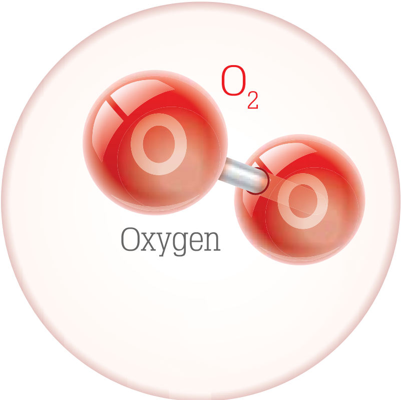
> **DO YOU KNOW?** The most abundant atom in the universe is the hydrogen atom. Nearly 74% of the atoms in the universe are hydrogen atoms. However, three most abundant atoms on the Earth are iron, oxygen and silicon.

3.2 Molecules

When an atom combines with another atom (or atoms) and forms a compound, it is called as molecule. *A molecule is made up of two or more atoms chemically combined.*

OX397

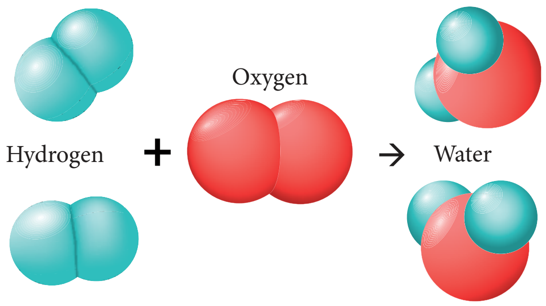
Oxygen gas in the air that we breathe is made up of two oxygen atoms chemically combined.



Ozone is a substance that is made up of three oxygen atoms chemically combined.

An atom of oxygen (O) and two atoms of hydrogen (H) combine to form a molecule of water (H_2O).

$$2H_2 + O_2 \rightarrow 2H_2O$$



$$2H_2 + O_2 \rightarrow 2H_2O$$

Formation of water molecule

Molecules exhibit the properties of matter and also have individual existence. A molecule can be formed by the same or different kinds of atoms.

Molecules can be classified as below.

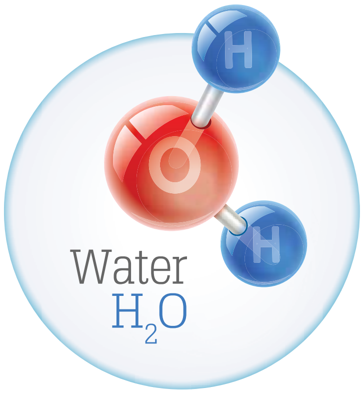
- A molecule which contains only one atom is called monatomic molecule (Inert gases).
- A molecule which contains two atoms is called diatomic molecule (Oxygen, Nitric oxide, Hydrogen, etc.).
- A molecule containing three atoms is called a triatomic molecule (Ozone, Sulphur dioxide, Carbon dioxide, etc.).
- A molecule containing more than three atoms is known as polyatomic molecule (Phosphate, Sulphur, etc.).

3.2.1 Molecules of Elements

A molecule of an element consists of fixed number of one types of atom chemically combined. Table 3.1 shows that gases are made up of two atoms of the same element.

3.2.2 Molecules of Compounds

Molecule of a compound consists of a fixed number of different types of atoms chemically combined. For example, let us look at the model of a water molecule below. Each molecule of water consists of one oxygen atom and two hydrogen atoms. The ratio of oxygen and hydrogen atoms remains fixed whether water is in liquid, solid or gaseous state. This principle applies to the molecules of all compounds. Compounds with different atoms are given in Table 3.2.



Model of water molecule

Bismuth in diarrhea medicine

Bismuth is an element that occurs naturally. It is combined with other elements to make medicine for treating diarrhea.

Table 3.1 Compounds with same atoms

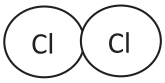
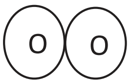
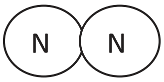
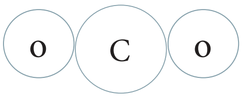
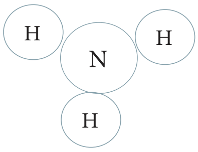
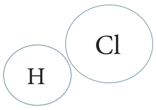
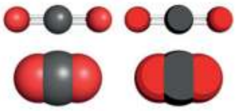
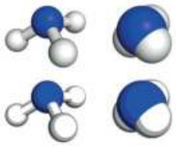
Molecule	Chlorine Gas	Oxygen Gas	Nitrogen Gas
Molecule Diagram			
Molecule Model (Ball-and-Stick)	Chlorine Molecule	Oxygen Molecule	Nitrogen Molecule

Table 3.2 Compounds with different atoms

Molecule	Carbon dioxide	Ammonia	Hydrogen Chloride
Molecule Diagram			
Molecule Model (Ball-and-Stick)	 Carbon-dioxide Molecule	 Ammonia Molecule	Hydrogen Chloride

3.3 Elements

Matter is classified into two broad categories, namely, pure substances and mixtures. Pure substances are further divided into two categories as elements and compounds.

Matter in its simplest form is called an element. We are using many elements in our daily life. The common salt consists of two elements, sodium and chlorine. Water consists of hydrogen and oxygen. Magnesium and phosphorus are used for making crackers. Sulphur is used as manure in agriculture. Gallium is used for making mobile phones and silicon is used for making computer chips.

There are 118 known elements till date. Out of these, 94 elements occur naturally while 24 elements are synthesised artificially in the laboratory.

3.3.1 Classification of Elements

We can classify the elements broadly into metals, non-metals and metalloids based on their chemical properties.

DO YOU KNOW?

Robert Boyle is the first scientist who used the term element. He is the early proponent of the elemental nature of matter and the nature of vacuum. He is known best for Boyle's Law.

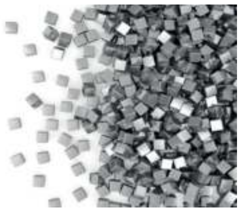
Metals

We have tools, utensils and jewellery made of silver, copper, iron, gold, aluminium, etc. By hammering or rolling we can deform these materials into various shapes. Such elements that are malleable (a material may be flattened into thin sheets or various shapes) are called as metals.

Metals are generally hard and shiny elements. Sodium is one of the exceptions as it is soft. All metals, except mercury are solids at room temperature. Mercury is the only metal that is liquid at room temperature. Metals are malleable, can be bent or beaten into sheets. They can be drawn into wires. They are good conductors of heat and electricity. Copper, lead, tin, nickel, iron, zinc, gold, magnesium and calcium are examples of metals.

Copper

Lead


Nickel

Steel

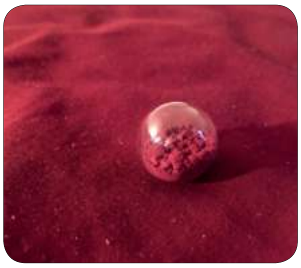
Iron

Zinc

Metals

Non-metals

Non-metals are generally dull and soft. However, diamond is shiny and also the hardest natural substance on earth. Non-metals can be gases, solids and liquids. Non-metals such as oxygen, hydrogen and chlorine are gases at room temperature. Carbon, iodine, sulphur and phosphorus are solids at room temperature. Bromine is the only non-metal that is liquid at room temperature. Non-metals are poor conductors of heat and electricity. However, graphite (a form of the non-metal carbon) is a good conductor of electricity.



Phosphorus

Sulpher

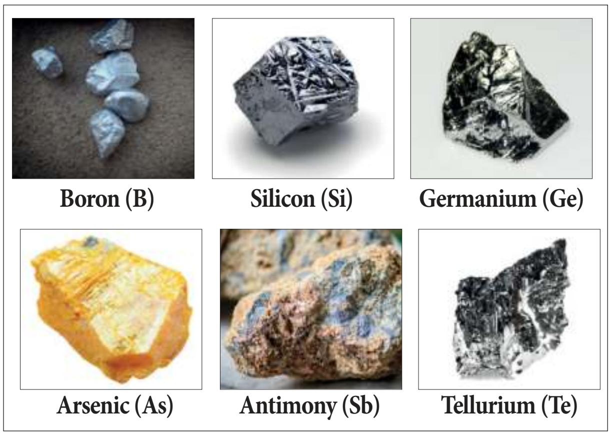
Non - metals

Table 3.3 Difference between metals and non-metals

Metals	Non-Metals
Metals are lustrous. They have a shiny surface.	Non metals are non lustrous. They have non- shiny surface.
Metals are generally hard.	Non-metals are generally soft.
Most metals can be bent, beaten into sheets and they can be drawn into wires.	Non-metals can not be bent, beaten into sheets and they can not be drawn into wires.
Most metals are good conductors of electricity.	Non-metals are bad conductors of electricity.
Most metals are good conductors of heat.	Non-metals are bad conductors of heat.
Most metals make ringing sound when struck. Hence, they are used to make objects like bells.	Non-metals does not make any sound when they are struck.

Metalloids

Metalloids exhibit the properties of both metals and non metals. Silicon, arsenic, antimony, and boron are some examples of metalloids.



Metalloids

3.3.2 Symbol of an element

A symbol is an abbreviation or short representation of a chemical element. There is a unique symbol for each element. It represents one atom of the element. The symbol is usually derived from the name of the element, which is either in English or Latin. These symbols are accepted by the International Union of Pure and Applied Chemistry (IUPAC).

Dalton was the first scientist to use the symbols for elements in a very specific sense. When he used a symbol for an element he also meant a definite quantity of that element, that is, one atom of that element. Berzelius suggested that the symbols of elements can be written as one or two letters of the name of the element.

The following rules are followed while assigning symbol to an element.

DO YOU KNOW?

In the beginning, the names of elements were derived from the name of the place where they were found for the first time. For example, the name copper was taken from Cyprus. Some names were taken from specific colours. For example, gold was taken from the English word meaning yellow. Now-a-days, IUPAC approves names of elements. Many of the symbols are the first one or two letters of the element's name in English. The first letter of a symbol is always written as a capital letter (uppercase) and the second letter as a small letter (lowercase).

ACTIVITY 1

Find out the symbols of the elements with the help of your teacher.

Elements	Symbol
Gold	
Silver	
Copper	
Iron	
Nitrogen	
Oxygen	
Aluminium	
Calcium	
Phosphorus	
Magnesium	
Potassium	
Sodium	

- Chemical symbols usually consist of one or two letters.
- The symbols of most elements correspond to the first letter (which is capitalized) of their English name. For example, the symbol for oxygen is O and that for hydrogen is H. You will study about symbols in details in standard 8.

3.3.3 Elements in human Body

Nearly 99% of the mass of our human body consists of just six chemical elements namely, oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. Another five elements make up most of the least percentage. They are potassium, sulphur, sodium, chlorine, and magnesium.

3.3.4 Elements in air

Air is a mixture of gases. The molecules of two different elements, nitrogen and oxygen, make up about 99% of the air. The rest includes small amounts of argon and carbon dioxide. Other gases such as neon, helium, and methane are present in trace amounts. Oxygen is the life-giving element in the air.

3.4 Compounds

A compound is a pure substance that is formed when the atoms of two or more elements combine chemically in definite proportions.

Compounds exhibit properties that are entirely different from the properties of their constituent elements. For example, the atoms of the elements hydrogen and oxygen combine chemically in a fixed ratio to form the compound water. However, water does not have the same properties of hydrogen and oxygen. For example, at room temperature water exists as liquid while hydrogen and oxygen exist as gases. Also, oxygen supports fire whereas water is used as a fire extinguisher.

Similarly, common salt (Sodium chloride) is a compound made up of elements sodium and chlorine. It is used in our food, whereas sodium and chlorine are poisonous, and both are unsafe for consumption.

Sodium is a highly reactive solid at room temperature . It burns vigorously when in contact with water

+

Chlorine is yellowish green poisonous gas at room temperature

→

Sodium Chloride (Used for cooking)

Chalk (Calcium, Carbon and Oxygen)

Sugar (Carbon, Hydrogen and Oxygen)

3.4.1 Properties of Compounds

- A compound is formed only when the constituent elements combine in a fixed proportion.
- The properties of a compound are different from those of its constituent elements.
- A compound cannot be broken down by physical methods. This is because a compound is made up of different elements that are chemically combined. Sodium chloride cannot be separated by physical methods such as filtration.
- A compound can be separated into its constituent elements by chemical methods only.

ACTIVITY 2

Complete the following table.

Compound	Constituent Elements
Water	
Salt (Sodium chloride)	
Sodium carbonate	
Baking soda (sodium bicarbonate)	
Sugar	
Calcium oxide	
Calcium hydroxide	
Sodium hydroxide	
Potassium hydroxide	

ACTIVITY 3

Complete the following table.

Formula	No. of different elements	Name of Elements
H_2O	H – 2 O – 1	Hydrogen, Oxygen
NaCl		
$C_6H_{12}O_6$		
NaOH		

Table 3.4 Difference between an element and a compound

Elements	Compounds
An element is the simplest substance.	A compound is a chemical substance formed by the combination of two or more elements.
Elements combine to form compounds.	Compounds can be split into elements.
Atoms are the fundamental particles of an element.	Molecules are the fundamental particles of a compound.

3.5 Chemical Formulae

Often we write water as H_2O. This is the chemical formula for water molecule. This means that each molecule of water has two hydrogen atoms combined with one oxygen atom. A chemical formula is a symbolic representation of one molecule of an element or a compound. It provides information about the elements present in the molecule and the number of atoms of each element. In H_2O, small number beside the 'H' is called subscript. It tells us the number of atoms of that element present in the molecule. Hence, there are two hydrogen atoms in water molecule. There is no number of besides 'O'. It means that there is only one atom of that element present in the molecule. Hence, there is 1 oxygen atom in a water molecule. Can you guess the types of atoms and number of each of the atoms in sodium chloride? Which is the chemical formula for cooking salt?

Here are some examples of chemical formula.

Sodium Chloride (Nacl)	:	1 atom of Sodium and 1 atom of chlorine
Ammonia (NH_3)	:	1atom of Nitrogen and 3 atoms of Hydrogen
Glucose ($C_6H_{12}O_6$)	:	6 Carbon atoms, 12 Hydrogen atoms and 6 Oxygen atoms

The chemical formula tells us the types of atoms and the number of each type of atom in one molecule of substance.

Table 3.5 Common compounds and their chemical formula

Names	Formula
Water	H_2O
Glucose	$C_6H_{12}O_6$
Salt	NaCl
Ethanol	C_2H_5OH
Ammonia	NH_3
Sulphuric Acid	H_2SO_4
Methane	CH_4
Sucrose	$C_{12}H_{22}O_{11}$

3.6 Atomicity

In chemistry, atomicity implies the total number of atoms present in one molecule of an element, compound or a substance. Let us see how to calculate the atomicity of elements. For example, oxygen exists as a diatomic molecule. It means that a molecule of oxygen contains two atoms hence its atomicity is 2.

$$O + O \longrightarrow O_2$$

Oxygen atom + Oxygen atom ⟶ Oxygen Molecule

Similarly a phosphorus molecule (P_4) contains 4 atoms and a sulphur molecule (S_8) contains 8 sulphur atoms. Hence, their atomicity is 4 and 8 respectively.

For molecule containing more than one types of atoms, simply count the number of each atom and that would be its atomicity. For example, one molecule of sulphuric acid (H_2SO_4) consists of 2 hydrogen atom, 1 sulphur atom and 4 oxygen atoms. Hence, its atomicity is 7(2+1+4).

One molecule of water (H_2O) contains two atoms of hydrogen and one atom of oxygen. Thus, the atomicity of water is three.

Table 3.6 Atomicity of some elements

Element	Atomicity	Elements	Atomicity
H	2	F	2
He	1	Ne	1
Li	1	Na	1
Be	1	Mg	**1**
N	2	P	4
O	2	S	8

ACTIVITY 4

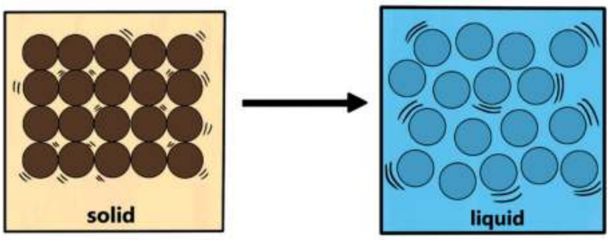
Write down the atomicity of the following elements and compounds

Elements / Compounds	Atomicity
Cl	
Na	
K	
Ca	
H_2O	
Nacl	

3.7 Effect of temperature on Solid, Liquid and Gas

In solids, particles are arranged very closely. When solids are heated, the particles in them gain energy and vibrate vigorously. They move slightly further apart from one another. This causes the volume of matter to increase. This process is called expansion. How it happens?

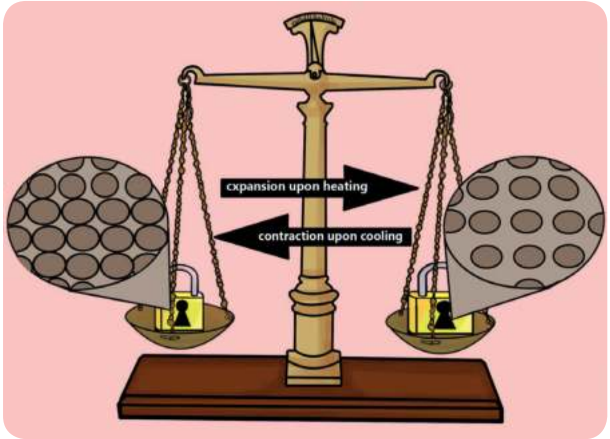
The matter begins to expand when heated and the volume increases due to the increase in the distance between the particles. But, the size of the particles remains same.



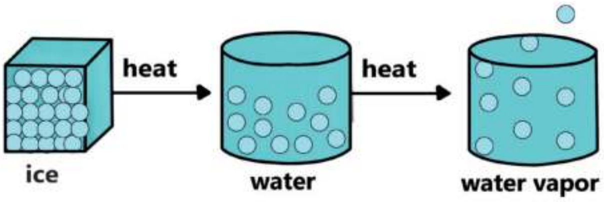
DO YOU KNOW?

How do hot-air balloons float? When air inside the hot air balloon is heated with a burner, it expands. The expansion causes the density of the air inside the balloon to decrease. Hence, the air inside the balloon has a lower density than the air outside the balloon. This difference in density allows the hot-air balloon to float.

During heating or expansion, the mass of matter does not change. Although the volume of the matter changes, the size and number of the particles of matter do not change. Hence, during heating, the mass of matter is conserved. For example, in an iron lock the distance between the iron particles increases when they gain enough heat. However, the number of iron particles does not change. Hence, the mass of the iron lock is conserved.



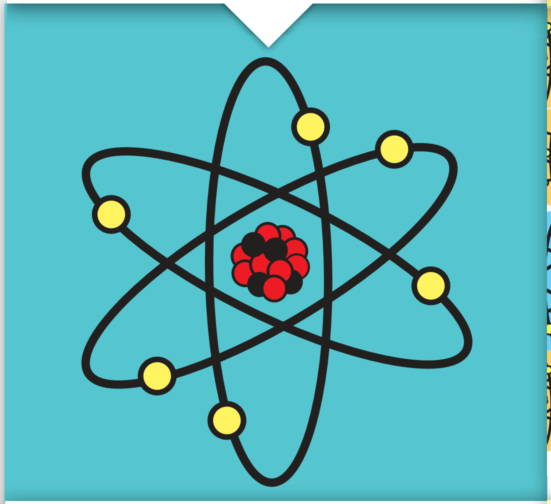
The melting of ice is an example for change of states of matter. The change in the states of matter occurs during melting, boiling and freezing and condensation. When the particles possess enough energy, they overcome the strong forces of attraction between one another. They break free from one another and move randomly. For example, when solid ice is heated to 0^0C, it melts to become liquid water. In the same way, when liquid water is heated to 100^0C, it boils to become steam.



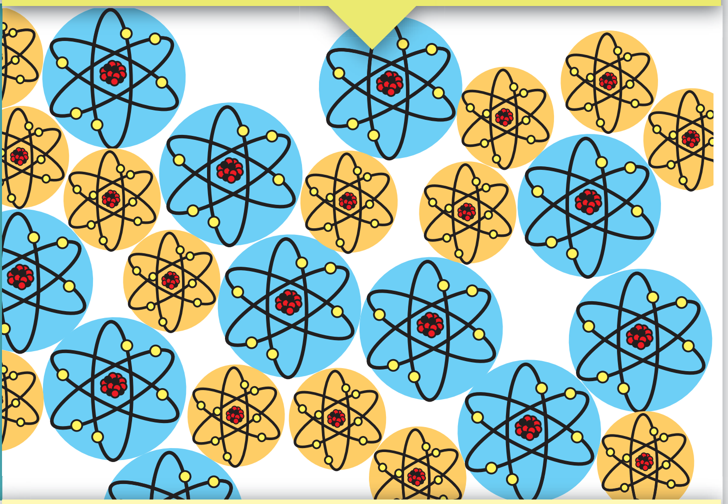
1. Solid
When solid is heated, the particles gain energy and vibrate more vigorously
2. Liquid
When the melting point is reached melting occurs. The solid changes to its liquid state.
When a liquid is heated the particles gain energy and vibrate more vigorously.
3. Gas
Boiling occurs when the boiling point is reached. The liquid changes to its gaseous state.

Configuration of Matter

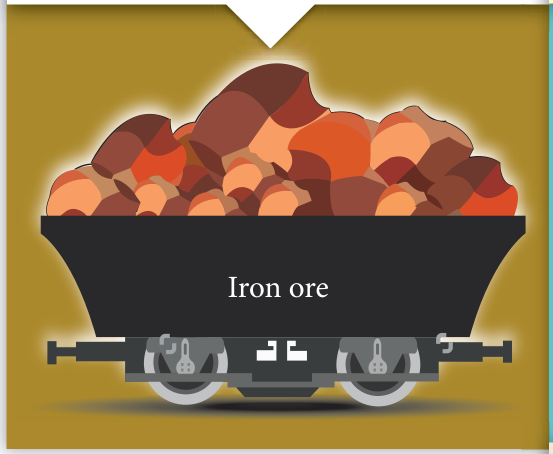
ATOM
Smallest particle of an Element



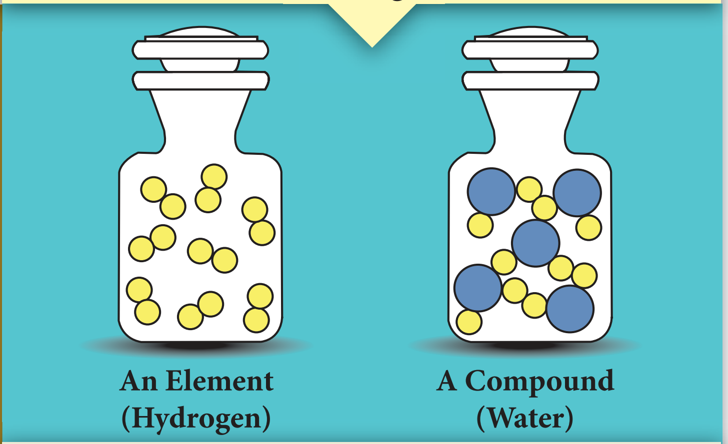
MOLECULE
Atoms makes molecules



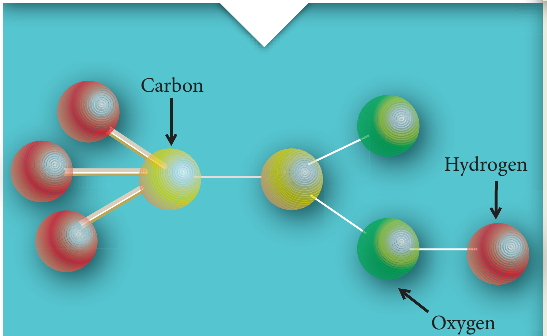
ELEMENT
Chemically simplest substance which cannot be broken down



COMPOUND
Two or more elements which are chemically bonded together

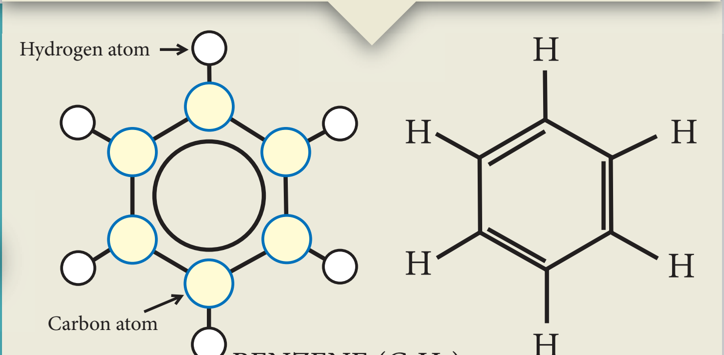


CHEMICAL FORMULA
Tells the number of atoms of an element in a compound



ACETIC ACID (CH_3 COOH)

CHEMICAL SYMBOL
Short representation of an Element



BENZENE (C_6H_6)

Points to Remember

- ❖ Elements are the simplest forms of pure substances.
- ❖ Molecules of an element consist of a fixed number of one type of atom.
- ❖ Molecules of a compound consist of a fixed number of different types of atom.
- ❖ The molecules of the elements nitrogen and oxygen make up 99 percent of the air.
- ❖ An atom is the smallest particle of an element.
- ❖ The particulate nature of matter can be used to explain heating effect of solid, liquid and gas.
- ❖ The mass of the matter remains same during expansion.
- ❖ A molecule is made up of two or more atoms chemically combined.
- ❖ We can represent a molecule using chemical formula.

Evaluation

2JUNWS

I. Choose the appropriate answer.

1. Which one of the following is an example for a metal?

   a. Iron   b. Oxygen   c. Helium   d. Water

2. Oxygen, hydrogen, and sulphur are examples for

   a. metals   b. non-metals

   c. metalloids   d. inert gases

3. Which of the following is a short and scientific way of representing one molecule of an element or compound?

   a. Mathematical formula

   b. Chemical formula

   c. Mathematical symbol

   d. Chemical symbol

4. The metal which is liquid at room temperature is

   a. chlorine   b. sulphur

   c. mercury   d. silver

5. An element which is always lustrous, malleable and ductile is

   a. non-metal   b. metal   c. metalloid   d. gas

II. Fill in the blanks.

1. The smallest particle of matter that can exist by itself is ______________.
2. A compound containing one atom of carbon and two atoms of oxygen is ______________.
3. ______________ is the only non-metal which conducts electricity.
4. Elements are made up of ______________ kinds of atoms.
5. ______________ of some elements are derived from Latin or Greek names of the elements.
6. There are ______________ number of known elements.
7. Elements are the ______________ form of pure substances.
8. The first letter of an element is always written in ______________ letter.
9. Molecule containing more than three atoms are known as______________.
10. ______________ is the most abundant gas in the atmosphere.

III. Analogy.

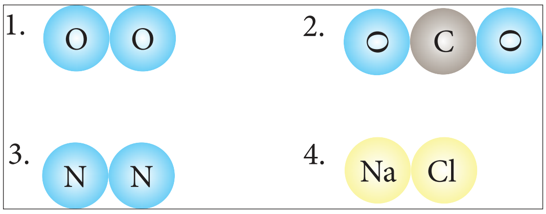
1. Mercury : Liquid at room temperature :: Oxygen: ______________.
2. Non-metal conducting electricity : ______________ :: Metal conducting electricity : Copper
3. Elements : Combine to form compounds :: Compounds :______________.
4. Atoms : Fundamental particle of an element :: ______________ : Fundamental particles of a compound.

IV. State true of false. If false, give the correct statement.

1. Two different elements may have similar atoms.
2. Compounds and elements are pure substances.
3. Atoms cannot exist alone. They can only exist as groups called molecules.
4. NaCl represents one molecule of sodium chloride.
5. Argon is mono atomic gas.

V. Answer in brief.

1. Write the chemical formula and name the elements present in the following compounds.
   a. Sodium chloride
   b. Potassium hydroxide
   c. Carbon dioxide
   d. Calcium oxide
   e. Sulphur dioxide
2. Classify the following molecules as the molecules of element or compound.



3. What do you understand by chemical formula of a compound? What is its significance?
4. Define the following terms with an example for each.
   a. Element
   b. Compound
   c. Metal
   d. Non-metal
   e. Metalloid
5. Write the symbols for the following elements and classify them as solid, liquid and gas.
   Aluminum, Carbon, Chlorine, Mercury, Hydrogen and Helium
6. Classify the following as metals, non-metals and metalloids.
   Sodium, Bismuth, Silver, Nitrogen, Silicon, Carbon, Chlorine, Iron, Copper
7. Classify the following as elements and compounds.
   Water, Common salt, Sugar, Carbon dioxide, Iodine and Lithium
8. Write the chemical formula for the following elements.
   a. Hydrogen   b. Nitrogen
   c. Ozone   d. Sulphur
9. What are elements? What are they made of? Give two examples.
10. Define molecule.
11. What are compounds? Give two examples.
12. Give an example for the elements derived from their Latin names.
13. What is atomicity of elements?
14. Calculate the atomicity of H_2SO_4.

VI. Answer in detail.

1. Differentiate metals and non-metals.
2. Explain the characteristics of compounds
3. Describe the different ways in which we can write the symbols of elements. Give appropriate examples.

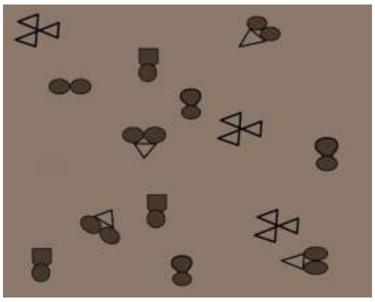
4. Differentiate between elements and compounds.
5. Write any five characteristics of compounds.
6. Compare the properties of metals and non-metals. Give three examples for each.
7. Write down the properties of metalloids.

VII. Rewrite the given sentence in correct form.

1. Elements contain two or more kind of atoms and compounds contain only one kind of atom.

VIII. Higher Order Thinking Skills.

1. List out the metals, non-metals and metalloids which you use in your house, schools. Compare their properties.
2. What changes take place in the movement and arrangement of particles during heating process?
3. In the diagram given below, the circle, square and triangle represent the atoms of different elements.



Identify all combinations that represent

a. molecule of a compound
b. molecule of an element consisting of two atoms
c. molecule of an element consisting of three atoms

4. Aakash noticed that the metal latch on gate was difficult to open during hot sunny days. However, it was not difficult to open the same latch at night. Aakash observed that the latch and the gate are exposed to the sun during day time.

a. Formulate a hypothesis based on the information provided.
b. Briefly state how you would test the hypothesis.

IX Consider the following statements and choose the correct option.

1. **Assertion:** Oxygen is a compound.
Reason: Oxygen cannot be broken down into anything simpler.
2. **Assertion:** Hydrogen is an element.
Reason: Hydrogen cannot be broken down into anything simpler.
3. **Assertion:** Air is a compound.
Reason: Air consists of carbon dioxide.
4. **Assertion:** Air is a mixture of elements only.
Reason: Only nitrogen, oxygen and neon gases exist in air.
5. **Assertion:** Mercury is solid in room temperature.
Reason: Mercury is a non-metal.

a. Both assertion and reason are true and reason is the correct explanation of assertion.
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

ICT CORNER

Matter around us

Let's build the molecules.

PROCEDURE :

Step 1: Use the URL to reach stimulation page. Click 'Download' and launch the stimulation.

Step 2: Drag the atoms from the kit which is at the bottom of the display to 'make molecule'. Click on "3D" to see the molecule in 3 dimension. And drag that molecule to 'Your molecule collection' on the left side window.

Step 3: Click on the 'collect multiple' tab on the top of the window for more molecules.

Step 4: Click on the 'Larger molecules' tab to make larger molecules.

Step 1

Step 2

Step 3

Step 4

Matter around us URL:

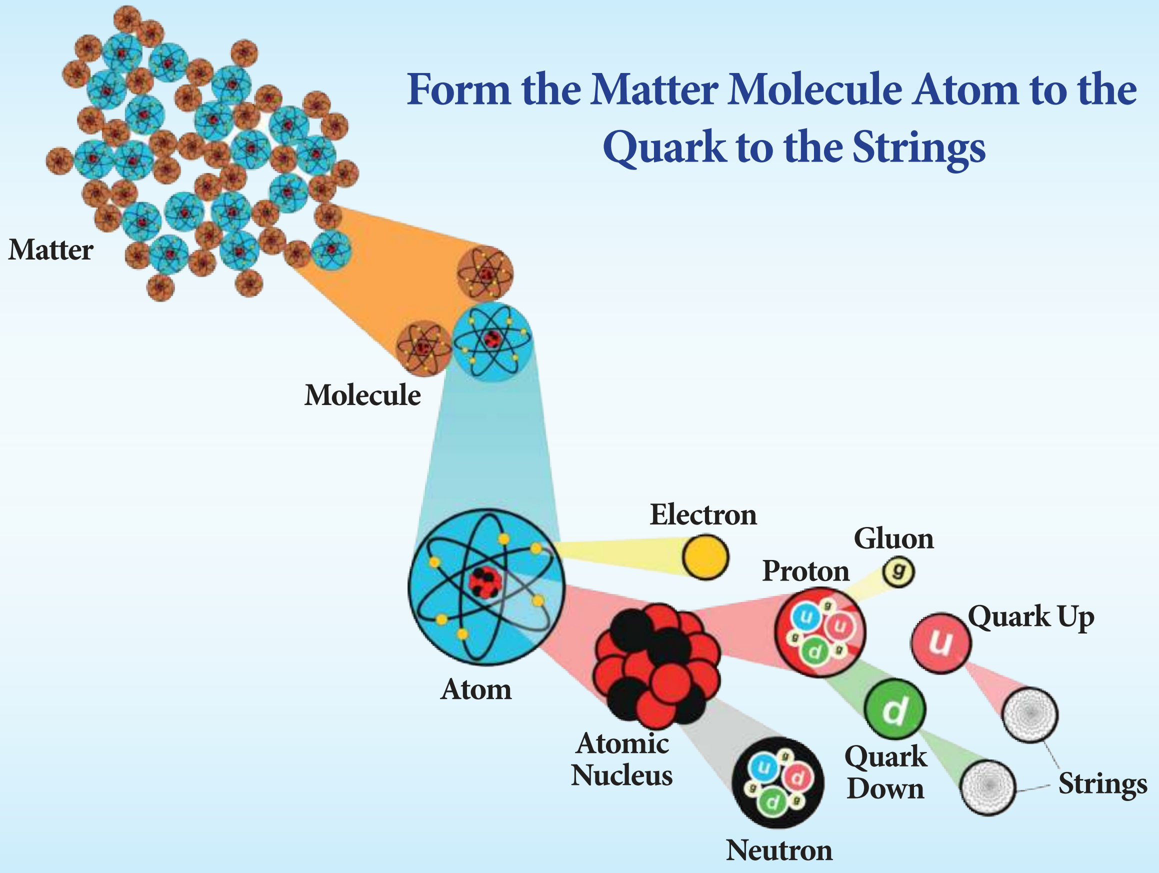
https://phet.colorado.edu/en/simulation/build-a-molecule

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.

Unit 4

Atomic Structure



Learning Objectives

After studying this unit, students will be able to:

- know the structure of an atom.
- know the position of the sub-atomic particles.
- understand and compare the properties of sub-atomic particles.
- understand the terms atomic number and mass number.
- calculate the number of protons, electrons and neutrons in an atom from the symbols given in the periodic table.
- understand the term valency.

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Introduction

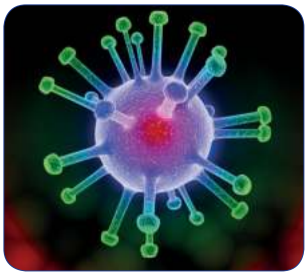
In the last chapter we studied that anything around us is matter and it is made up of molecules. The molecules are combination of atoms of different elements or the same element. Table, chair, bag, book, chalk and blackboard, in short everything you see around are made up of atoms. Atoms are the smallest particles. They cannot be seen even through a microscope. In this lesson, we are going to study about atomic theories, sub-atomic particles, atomic number and mass number and valency.

4.1 Atomic Theories

An atom is thousand times smaller than the thickest human hair. It has an average diameter of 0.000000001 m or 1×10^{-9} m. To understand the size of an atom, now let us find what is the size of known things like pencil, red blood cell, virus and dust particle.

Pencil (1×10^{-2} m)

Red Blood Cell (1×10^{-4} m)

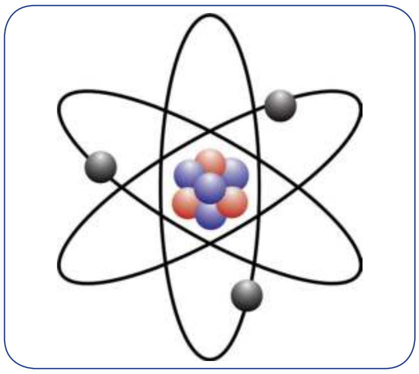


Virus (1×10^{-6} m)

Dust Particle (1×10^{-7} m)

Now you could imagine how small an atom would be.

Many scientists have studied the structure of the atom and advanced their theories about it. The theories proposed by Dalton, Thomson and Rutherford are given below.



Atom (1×10^{-10} m)

4.1.1 Dalton's atomic theory

John Dalton

John Dalton proposed an atomic theory in the year 1808. He proposed that matter consists of very small particles which he named atoms. An atom is the smallest indivisible particle. It is spherical in shape. His theory does not propose anything about the positive and negative charges of an atom. Hence, it was not able to explain many of the properties of substances.

DO YOU KNOW?

Nanometer is the smallest unit used to measure small lengths. One nanometer is equal to 1×10^{-9} m.

4.1.2 Thomson's theory

J.J. Thomson

In 1897 J.J Thomoson proposed a different theory. He compared an atom to a watermelon. His theory proposed that an atom has positively charged part like the red part of the watermelon and in it are embedded, like the seeds, negatively charged particles

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ACTIVITY 1

Some known objects and its broken particles are shown.

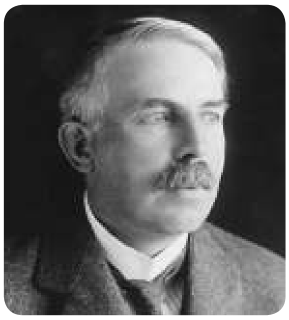
1. Name the objects you see here. Also try to write the particles by which each of them are made of?

1. -------------------
2. -------------------
3. -------------------
4. -------------------

which he called electrons. According to this theory as the positive and negative charges are equal, the atom as a whole does not have any resultant charge.

Thomson's greatest contribution was to prove the existence of the negatively charged particles or electrons in an atom by experimentation. For this discovery, he was awarded the Nobel Prize in 1906. Although this theory explained why an atom is neutral, it was an incomplete theory in other ways.

4.1.3 Rutherford's theory


Rutherford

There were shortcoming in Thomson's theory. Earnest Rutherford gave a better understanding. Earnest Rutherford conducted an experiment. He bombarded a very thin layer of gold with positively charged alpha rays. He found that most of these rays which travel at a great velocity passed through thin gold sheet without encountering any obstacles. A few are, however, turned back from the sheet. Rutherford considered this remarkable and miraculous as if a bullet had turned back after colliding with tissue paper. Based on this experiment, Rutherford proposed his famous theory. They are:

1. The fact that most alpha particles pass through the gold sheet means that the atom consists mainly of empty space.
2. The part from which the positively charged particles turned back is positively charged but it is very small in size as compared to the empty space.

From these inferences, Rutherford presented his theory of the structure of atoms. For this theory, he was awarded the Nobel prize for chemistry.

Rutherford's theory proposes the following.

1. The nucleus at the centre of the atom has positive charge. Most of the mass of the atom is concentrated in the nucleus.
2. The negatively charged electrons revolve around the nucleus in specific orbits.
3. In comparison with the size of the atom, the nucleus is very very small.

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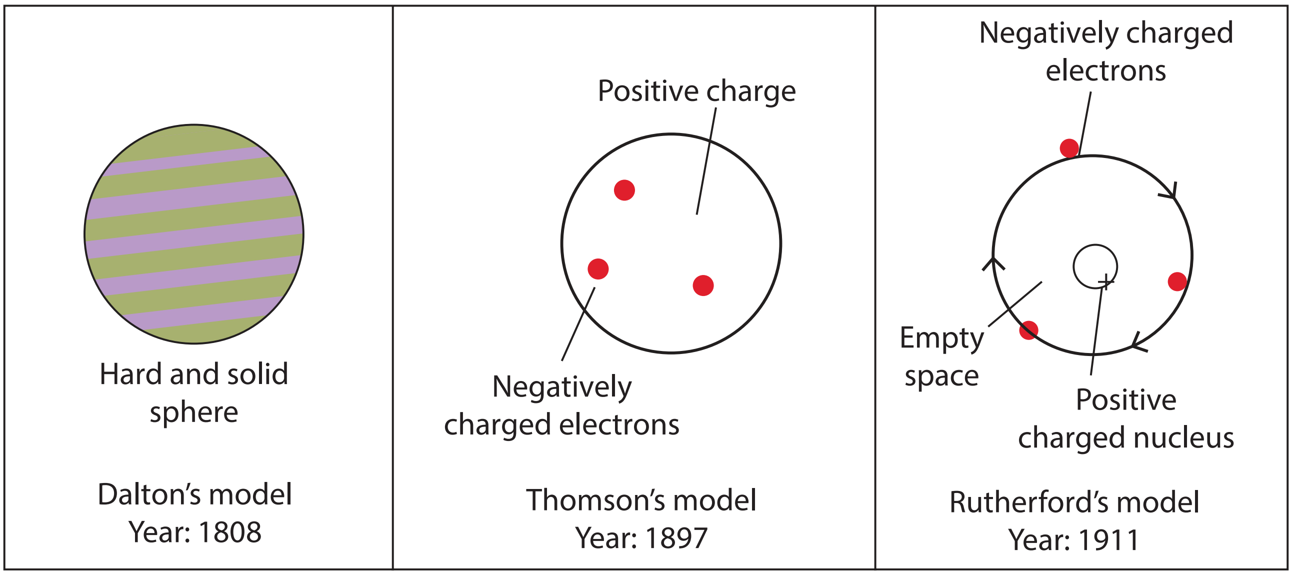
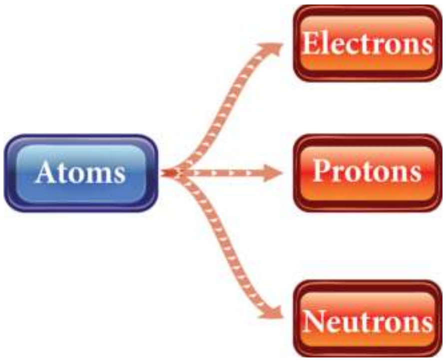
Stages of discovery of the consitituents of an atom



> **DO YOU KNOW?**
>
> You have around 7 billion atoms in your body, yet you replace about 98% of them every year!

4.2 The sub-atomic particles

The discoveries made during the twentieth century proved that atoms of all elements are made up of smaller components - electron, proton and neutron. An electron from hydrogen atom is no different from the electron of a carbon atom. In the same manner, protons and neutrons of all elements also have same characteristics. These particles that make up the atom are called 'subatomic particles'.



Proton (p)

The proton is the positively charged particle and it is located at the nucleus. Its positive charge is of the same magnitude as that of the electron's negative charge.

Neutron (n)

Neutron is inside the nucleus. The neutron does not have any charge. Except hydrogen (protium), the nucleus of all atoms contain neutrons. Protons and neutrons are the two types of particles in the nucleus of an atom. They are called nucleons.

Electron (e)

This is a negatively charged particle. Electrons revolve around the nucleus of the atom in specific orbits. The mass of an electron is negligible as compared to that of a proton or neutron. Hence, the mass of an atom depends on the number of protons and neutrons in the nucleus.

The total negative charge of all the electrons outside the nucleus is equal to the total positive charge in the nucleus. That makes the atom electrically neutral.

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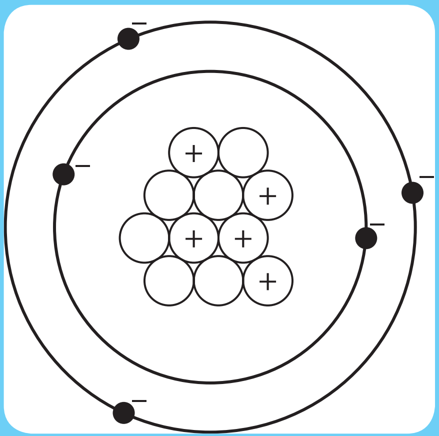
Table 4.1 Charge and mass of sub-atomic particles

Particle	Discoverer	Symbol	Charge	Mass (kg)
Proton	Goldstein	p	+1	1.6726×10^{-27}
Electron	Sir John Joseph Thomson	e	-1	9.1093×10^{-31}
Neutron	James Chadwick	n	0	1.6749×10^{-27}

ACTIVITY 2

Look at the given diagram and answer the following questions.



1. The positively charged particle is ________________.
2. The negatively charged particle is ________________.
3. ________________ is the neutral particle.

4.3 Atomic number and Mass number

If all the elements are made up of same sub-atomic particles, how will a carbon atom differ from an iron atom? Further investigations led to the discovery that the number of protons inside the nucleus of an atom determines what element it is. For example, if the nucleus has only one proton, then all such atoms are hydrogen atoms. If there are eight protons then that atom is oxygen.

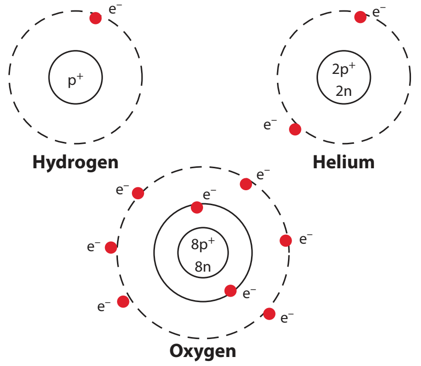
DO YOU KNOW?

Is the structure of an atom same as the structure of the solar system? Yes ! It is similar to the solar system. It has a core (center) called nucleus and it has paths called orbits around the nucleus.

4.3.1 Atomic number (z)

The number of electrons or protons in an atom is called the atomic number of that atom. It is represented by the letter Z. If we know the atomic number of an atom, we can find the number of electrons or protons in it.

Look at the figures. The nucleus of hydrogen atom has one proton around which revolves one electron. It means that its atomic number (z) is 1.



In a helium atom, there are two protons in the nucleus and two electrons revolving in the orbit around the nucleus. So, the atomic number(z) of helium is 2.

Look at the atomic structure of oxygen shown in the figure. What is its atomic number?

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Try yourself

If the atomic number of carbon is 6, what is the number of electrons revolving in its orbit?

4.3.2 Mass number (A) or Atomic mass

We have seen that the mass of an atom is concentrated in its nucleus. From this, we can get the mass number (A). It is equal to the sum of the number of protons (p) and number of neutrons (n) in the nucleus.

Atomic mass or Mass number

= Number of Protons + Number of Neutrons

$A = p + n$

Lithium atom contains 3 protons and 4 neutrons. Its mass number (A) = 3+4 = 7. In a sodium atom, there are 11 Protons and 12 neutrons. Hence, its mass number (A) is 23 (11 + 12).

Try yourself

1. Why the atomic numbers and mass numbers are always whole numbers?
2. A sulphur atom contains 16 protons and 16 neutrons. Calculate its atomic number and mass number.

While writing the symbol of an element, its atomic number and mass number are also written. For example, the symbols of hydrogen, carbon and oxygen are written as $_1H^1$, $_6C^{12}$, $_8O^{16}$ respectively. All the elements in the periodic table have the following combination of protons, electrons and neutrons.

Table 4.2 Symbols of elements

Element	Symbol	Number of proton, electron, neutron,
Carbon	$_6C^{12}$	**6p,6e,6n**
Beryllium	$_4Be^9$	4p,4e,5n
Nitrogen	$_7N^{14}$	7p,7e,7n
Boron	$_5B^{11}$	5p,5e,6n

Isotopes

Atoms of element can have different number of neutrons. Such atoms will have same atomic number but different mass numbers. These atoms are called isotopes. For example, hydrogen has three isotopes. They are: Proteum ($_1H^1$), Deuterium ($_1H^2$), Tritium ($_1H^3$).

Isobars

Atoms that have the same mass number but different atomic numbers are called isobars. Example: Calcium ($_{20}Ca^{40}$), Argon ($_{18}Ar^{40}$).

Table 4.3 Elements and their symbols with their atomic number and mass number

Element	Symbol	Atomic number	Protons (p)	Neutrons(n)	Mass number(p+n)
Hydrogen	H	1	1	0	1
Helium	He	2	2	2	4
Aluminium	Al	13	13	14	27
Oxygen	O	8	8	8	16
Sodium	Na	11	11	12	23

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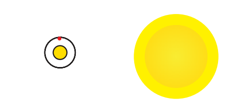
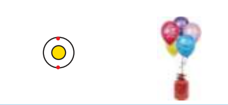
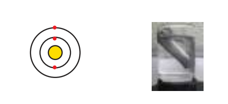
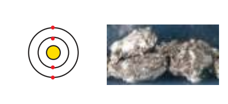
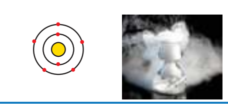
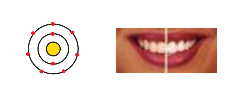
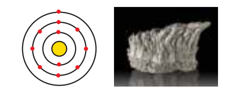
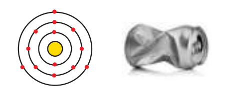
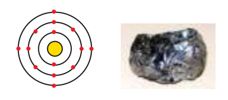
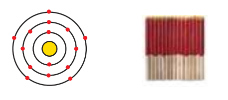
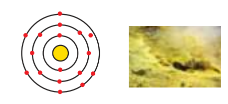
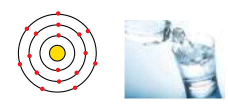
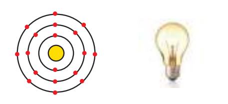
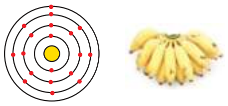
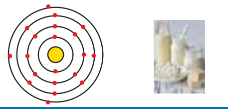
ACTIVITY 3

H Hydrogen Atomic Number: 1 Atomic Mass: 1 Protons: 1 Neutrons: 0 Electrons: 1 	**He** Helium Atomic Number: 2 Atomic Mass: 4 Protons: 2 Neutrons: 2 Electrons: 2 	**Li** Lithium Atomic Number: 3 Atomic Mass: 7 Protons: 3 Neutrons: 4 Electrons: 3 	**Be** Beryllium Atomic Number: 4 Atomic Mass: 9 Protons: 4 Neutrons: 5 Electrons: 4 	**B** Boron Atomic Number: 5 Atomic Mass: 11 Protons: 5 Neutrons: 6 Electrons: 5
C Carbon Atomic Number: 6 Atomic Mass: 12 Protons: 6 Neutrons: 6 Electrons: 6 	**N** Nitrogen Atomic Number: 7 Atomic Mass: 14 Protons: 7 Neutrons: 7 Electrons: 7 	**O** Oxygen Atomic Number: 8 Atomic Mass: 16 Protons: 8 Neutrons: 8 Electrons: 8 	**F** Fluorine Atomic Number: 9 Atomic Mass: 19 Protons: 9 Neutrons: 10 Electrons: 9 	**Ne** Neon Atomic Number: 10 Atomic Mass: 20 Protons: 10 Neutrons: 10 Electrons: 10
Na Sodium Atomic Number: 11 Atomic Mass: 23 Protons: 11 Neutrons: 12 Electrons: 11 	**Mg** Magnesium Atomic Number: 12 Atomic Mass: 24 Protons: 12 Neutrons: 12 Electrons: 12 	**Al** Aluminium Atomic Number: 13 Atomic Mass: 27 Protons: 13 Neutrons: 14 Electrons: 13 	**Si** Silicon Atomic Number: 14 Atomic Mass: 28 Protons: 14 Neutrons: 14 Electrons: 14 	**P** Phosphorus Atomic Number: 15 Atomic Mass: 31 Protons: 15 Neutrons: 16 Electrons: 15 
S Sulfur Atomic Number: 16 Atomic Mass: 32 Protons: 16 Neutrons: 16 Electrons: 16 	**Cl** Chlorine Atomic Number: 17 Atomic Mass: 35 Protons: 17 Neutrons: 18 Electrons: 17 	**Ar** Argon Atomic Number: 18 Atomic Mass: 39 Protons: 19 Neutrons: 20 Electrons: 19 	**K** Potassium Atomic Number: 19 Atomic Mass: 39 Protons: 19 Neutrons: 20 Electrons: 19 	**Ca** Calcium Atomic Mass: 20 Atomic Number: 40 Protons: 20 Neutrons: 20 Electrons: 20 

Observe the table given above and answer the following questions.

1. I am used for breathing, without me you cannot live. Write my name and symbol.

   ______________________________.

2. It is used in filling the balloons. It is a gas, identify it. What is its mass number?

   ______________________________.

3. Name the element present in banana. What is its atomic number?

   ______________________________.

4. I am found in crackers. How many protons do I have?

   ______________________________.

5. I am the most valuable element. Find who am I. Can you say my mass number?

   ______________________________.

4.4 Valency

When we shake hands with others, we can either shake hand with one persons using one hand or shake hand with two persons using both our hands. If we have more hands, we can shake hands with more persons. In the same manner atoms can share either one electron or two or three or four electrons and some cannot share any electron. This property is called valency.

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Table 4.4 Elements and their symbols with their atomic number and mass number and valency.

Element	Symbol	Atomic Number	Mass Number	Valency
Hydrogen	H	1	1	1
Carbon	C	6	12	4
Oxygen	O	8	16	2
Sodium	Na	11	23	1
Calcium	Ca	20	40	2

DO YOU KNOW?

What makes atoms stick together?

Electrons carry a negative electric charge, and protons carry a positive charge. The attraction between them holds electrons in orbits.

Valency is the combining property of an atom. It is a measure of how many hydrogen atoms it can combine with. For example, oxygen can combine with two hydrogen atoms and create water molecule. So, the valency of oxygen atom is two. In the case of chlorine, it can combine with only one hydrogen to create HCl (hydrochloric acid). Here, the valency of chlorine is one. Methane (CH_4) has one carbon atom combining with four hydrogen atoms. Can you guess the valency of carbon in methane? In ammonia molecule, nitrogen combines with three hydrogen atoms. What is the valency of nitrogen in ammonia?

Atoms of different elements combine with each other to form molecules. Valency determines the number of atoms of an element that combines with atom or atoms of another type.

The element having valency one is called monovalent. Example: Hydrogen and Sodium. The elements having valency two are called divalent. Example: Oxygen and Beryllium. The elements having valency three are called trivalent. Example: Nitrogen and Aluminium. Some elements exhibit more than one valency. For example, iron combines with oxygen to form two types of oxides namely, ferrous oxide (exhibits valency 2) and ferric oxide (exhibits valency 3). We will study about them in detail later.

When atoms of different elements combine with each other, molecules of compounds are formed. In these instances, it is necessary to know the valancies of those elements. Valencies of some elements are given in Table 4.4.

Points to Remember

- An atom is the smallest particle of an element that retains its chemical properties. They are very tiny compared to other particles.
- Atoms are too small to be seen by the naked eye or even through microscope.
- An atom consists mostly of empty space.
- Atoms of same element are identical, and atoms of different elements differ.
- An atom consists of a dense nucleus which has positively-charged protons and electrically-neutral neutrons.
- The protons and neutrons are called nucleons.
- An atom is electrically neutral. They contain equal number of protons and electrons.
- Atomic number is the number of protons in an atom.
- The total number of protons and neutrons present in the nucleus of an atom is called its mass number.
- Valency is defined as the combining capacity of an element.

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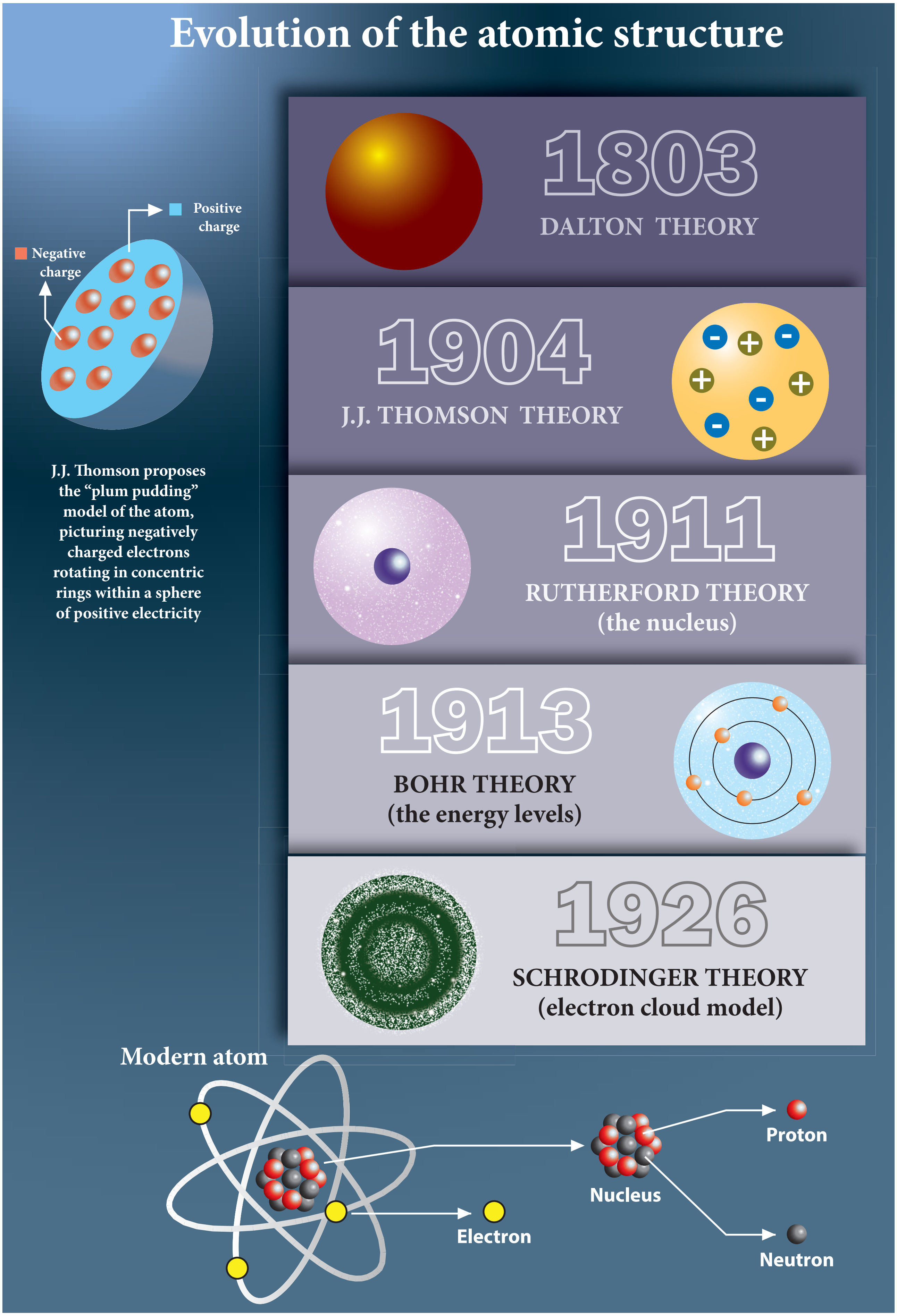

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Evaluation

I. Choose the appropriate answer.

1. The basic unit of matter is ________

   a. element   b. atom

   c. molecule   d. electron

2. The sub-atomic particle which revolves around the nucleus is _______

   a. atom   b. neutron

   c. electron   d. proton

3. _______ is positively charged.

   a. Proton   b. Electron

   c. Molecule   d. Neutron

4. The atomic number of an atom is the _______

   a. number of neutrons

   b. number of protons

   c. total number of protons and neutrons

   d. number of atoms

5. Nucleons comprises of _______________

   a. protons and electrons

   b. neutrons and electrons

   c. protons and neutrons

   d. neutrons and positron

II. Fill in the blanks.

1. The smaller particles found in the atom are called _________________.

2. The nucleus has __________________ and _______________ .

3. The _______________ revolve around the nucleus.

4. If the valency of carbon is 4 and that of hydrogen is 1, then the molecular formula of methane is_________________ .

5. There are two electrons in the outermost orbit of the magnesium atom. Hence, the valency of magnesium is_______________ .

III. Match the following.

Valency	Fe
Neutral particle	Proton
Iron	Electrons in the outermost orbit
Hydrogen	Neutron
Positively charged particle	Monovalent

IV. State true or false. If false, correct the statement.

1. The basic unit of an element is molecule.
2. The electrons are positively charged.
3. An atom is electrically neutral.
4. The nucleus is surrounded by protons.

V. Complete the analogy.

1. Sun : Nucleus :: Planets : ________________.
2. Atomic number : ________________ :: Mass number : Number of protons and neutrons.
3. K : Potassium :: C : ____________________.

VI. Consider the following statements and choose the correct option.

1. **Assertion**: An atom is electrically neutral.

   Reason: Atoms have equal number of protons and electrons.

2. **Assertion:** The mass of an atom is the mass of its nucleus.

   Reason: The nucleus is at the centre.

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3. **Assertion:** The number of protons or the number of neutrons is known as atomic number.

   Reason: The mass number is the sum of protons and neutrons.

VII. Answer very briefly.

1. Define – Atom.
2. Name the sub-atomic particles.
3. What is atomic number?
4. What are the characteristics of proton?
5. Why neutrons are called neutral particles?

VIII. Answer briefly.

1. Distinguish isotopes from isobar.
2. What are isotones? Give one example.
3. Differentiate mass number from atomic number.
4. The atomic number of an element is 9. It has 10 neutrons. Find the element from the periodic table. What will be its mass number?

IX. Answer in detail.

1. Draw the structure of an atom and explain the position of the sub-atomic particles.
2. The atomic number and the mass number of an element is 26 and 56 respectively. Calculate the number of electrons, protons and neutrons in its atom. Draw the structure.
3. What are nucleons? Why are they called so? Write the properties of the nucleons.
4. Define valency. What is the valency of the element with atomic number 8? What is the compound format by this element with hydrogen?

X. Higher Order Thinking Skills.

1. An atom of an element has no electron. Will that atom have any mass or not? Can an atom exist without electron? If so then give example.
2. What is common salt? Name the elements present in it. Write the formula of common salt. What are the atomic number and the mass number of the elements? Write the ions in the compound.

XI. Project.

To have an idea of what atoms are, students can be asked to construct atoms using pipe cleaners (thin metal wires-electron shells), pom-poms (balls-different colours for protons and neutrons) and beads (electrons). Students will love and enjoy putting them together and they look great hanging from the ceiling in the classroom.

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ICT CORNER

Atomic Structure

Let’s build an atom.

PROCEDURE :

Step 1: Use the URL to reach stimulation page. Click play button to launch the simulation.

Step 2: Click on the”ATOM” , a new window will be open. Drag the particles (Protons, Neutrons and Electrons) from the baskets which is at the bottom of the display.

Step 3: You can observe the changes in ‘Elements, Net charge and Mass number’ at the right side windows.

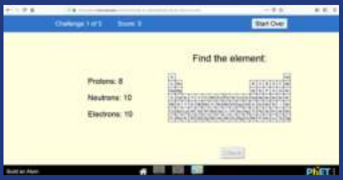
Step 4: Click on the ‘Symbol” at the bottom. Drag the particles and get the Symbol of the element.

Step 5: Click on the”GAME” and play the games.

Step 1

Step 2

Step 3



Step 4

Atomic Structure URL:

https://phet.colorado.edu/en/simulation/build-an-atom

8K9VU

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.

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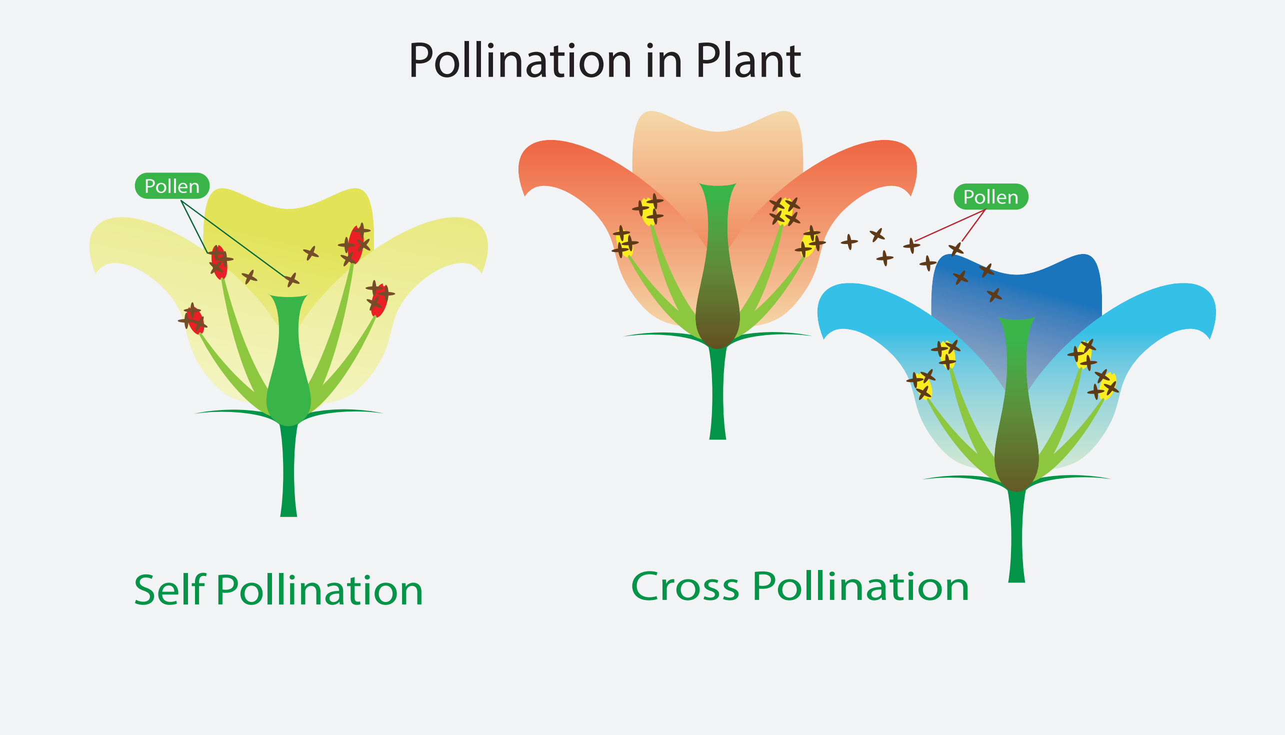
Unit 5

Reproduction and Modification in Plants



Learning Objectives

After studying this lesson, students will be able to:

- understand how a flower becomes a fruit with seed through pollination and fertilization.
- acquire knowledge about pollination and pollinators.
- differentiate self pollination and cross pollination in plants.
- know about the modification of root, stem and leaves.
- understand how these modifications are useful to animal and human being.

Introduction

We know already that flowering plants have root, stem and leaves. They are called vegetative organs. Flowers, fruits and seeds in a plant are called reproductive organs. In earlier classes we have seen that new plants can be grown from seeds. In this lesson, we are going to know how a flower changes itself into a fruit, and the modifications of root, stem and leaves of a plant.

5.1 Reproduction

ACTIVITY 1

Aim

To raise a new generation of plant from watermelon and potato.

Materials required

Two pots with soil, potato, watermelon seeds and water.

Procedure

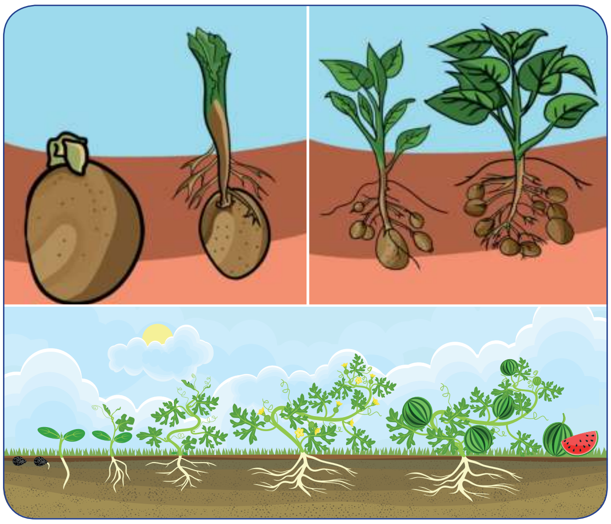
Fill both pots with soil mixed with compost or manure. Take a young potato. Ensure that it is not dried up and the skin still looks fresh. Bury a potato in one pot. Sow watermelon seeds in another pot. Pour water regularly and maintain the plant.

Observation

After few days, we can see a single plant arising from a buried potato. Plants arise from the pot sowed with watermelon seeds. Each seed produces a plant.

We can see from this activity that watermelon plant is produced from that seeds. Potato plant is not from seed, but from the stem tuber (vegetative part). Seed is not only the source for new generation, even vegetative part of a plant can be used to produce a new plant.

The process by which plants and animals produce young ones and increase their number is known as 'reproduction'. Drumstick tree can be grown from both seeds and stem cuttings. When plants are reproduced from the seeds we call that process as **sexual reproduction.** All other ways of reproduction without seed are called as **asexual reproduction.**



Reproduction in plants

ACTIVITY 2

Find out how these plants reproduce.

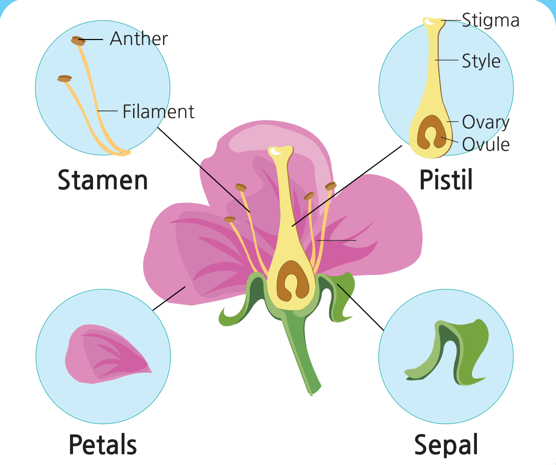
Sl. No.	Name of the plant	Reproductive Part			
		Seed	Stem	Cutting	Layering
1.	Mango				
2.	Potato				
3.	Banana				
4.	Tamarind				
5.	Rose				
6.	Mustard				
7.	Coriander				
8.	Moringa				
9.	Pumpkin				
10.	Radish				

5.2 Sexual reproduction

Seed is produced from a flower by the process of pollination and fertilization. This is known as sexual reproduction. To understand how seeds are formed in a flower, first we need to understand parts of a flower.

ACTIVITY 3

Take a flower. Dissect it longitudinally as shown in the figure and find the parts inside the flower. Can you identify the male reproductive part, androecium (stamen, filament and pollen sac)? Carefully observe the female reproductive part, gynoecium (ovary, style and stigma). If they are not seen clearly, gently pluck off the sepals and petals. Make a drawing of the parts and arrange them in your notebook.



L.S. of a flower showing its parts

5.2.1 Parts of flower

Let us compare few buds and opened flowers of **Hibiscus and Datura.** Observe bud and opened flower of **Hibiscus** and **Datura.** We can tabulate the characteristics of Hibiscus and Datura flowers as below.

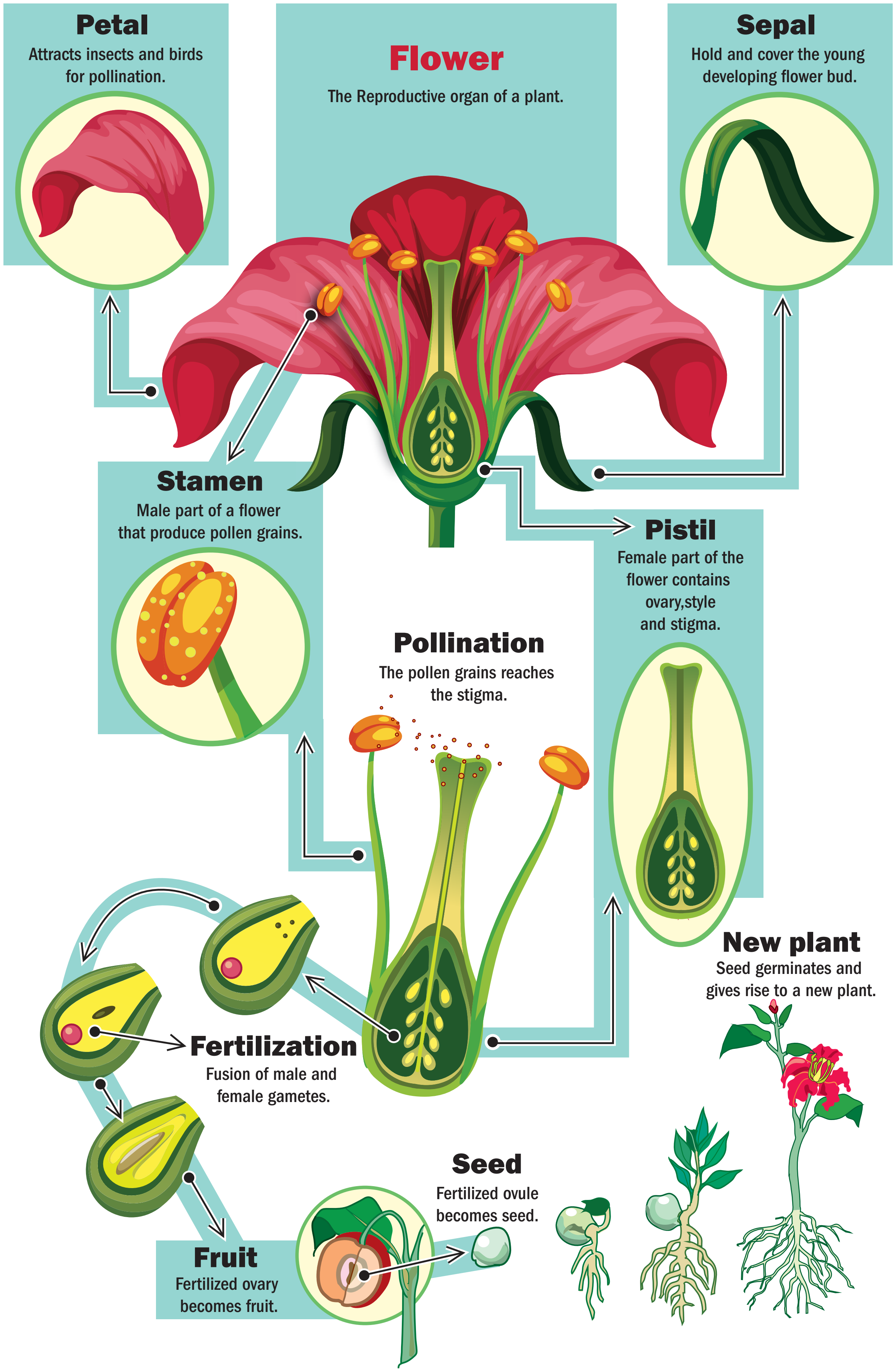
Hibiscus flower	
Bud	**Opened flower**
Green colour	Bright colour
Sepals	Petals
Dissected Hibiscus flower	
Bud	**Opened flower**
Curled petals	Expanded petals
Small tube with yellow lobes - Anthers	Expanded tube with yellow lobes -Anthers

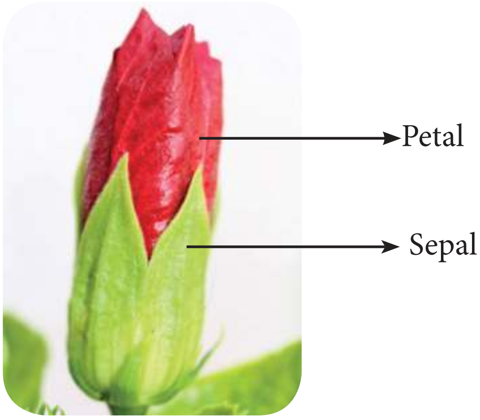
Datura flower	
Bud	**Opened flower**
Green colour	White colour
Sepals	Petals
Dissected Datura flower	
Bud	**Opened flower**
Curled petals	Expanded petals
Small yellow lobes-Anthers	Expanded yellow lobes-Anthers

In a bud, we can see a green colour, leaf like structure which cover the whole bud or flower. Each of these green leaf like structure present as an outermost layer is called as **sepal**. This outer most ring of sepals is known as **calyx.**

Petals are the largest part of flowers. They are often attractive, brightly coloured, sometimes sweet scented and attract the insects. This ring of **petals** together is called **corolla**.

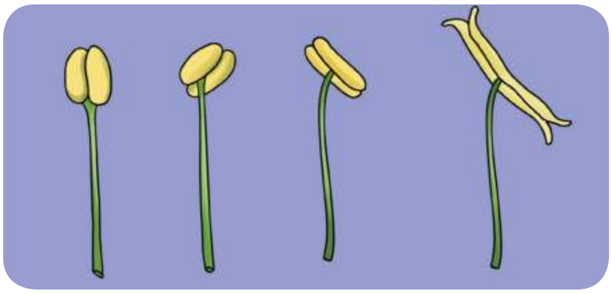
SEXUAL REPRODUCTION IN PLANTS





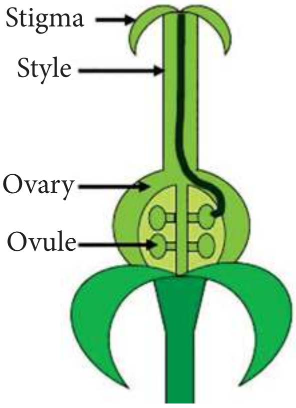
Sepal and Petal

Inside corolla, in **Hibiscus,** we can observe a long tube on which many stamens are arranged. But, in **Datura** we can see only five stalked structures, stamens. This ring or whorl of a flower is called **androecium.** Each stamens consists of two parts – a stalk called filament and a lobe called anther. If you touch these lobes in a mature flower, we can get a powdery substance called pollen grains (male reproductive part).



Androecium - Male part of the flower

Inside androecium whorl, we can find a female reproductive part of the flower, called gynoecium. You will find this part with a swollen bottom part.



Gynoecium – Female reproductive part

This is the ovary. Seeds are produced in this part. On top of the ovary there is a slender tube like structure called style. The top most sticky tip of the style is stigma. Pollen grains are received by the stigma. This is the fourth whorl of a flower.

5.2.2 Types of flowers

Flowers can be divided into two types. They are explained below.

Complete Flower

If all the four whorls - calyx, corolla, stamens and pistil are present, then it is called as complete flower. Complete flowers are bisexual flowers.

Incomplete Flower

If any of these four whorls is missing, then it is called as incomplete flower. Incomplete flowers are unisexual flowers. There are two types of unisexual flowers, **male flower** and **female flower**.

The flower with androecium and without gynoecium is called as **male flower** and the one with gynoecium and without androecium is known as **female flowers**.

DO YOU KNOW?

Sunflower is not a single flower. It is a group of flowers clustered together. A group of flowers arranged together is called inflorescence. *Tridax procumbens*, looks like a single flower, but it is an inflorescence. Leaf juice of this plant is used to cure wounds and cuts.

ACTIVITY 4

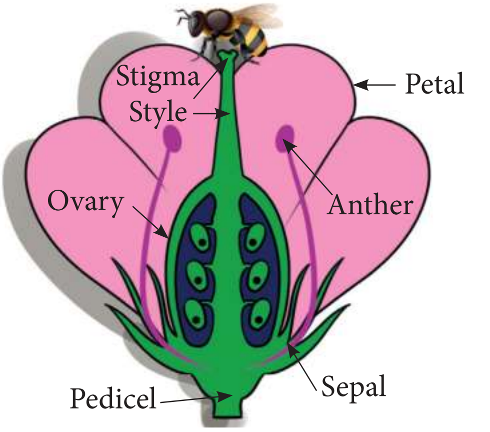
Make a flower album

Collect some flowers and press them between pages of newspaper or book. Place two thick sheets and keep a heavy object, such as brick, on the top to apply pressure. Turn the sides every two to three days. Allow flowers to dry completely. Collect the dried flowers and paste them in an album. Now, your flower album is ready.

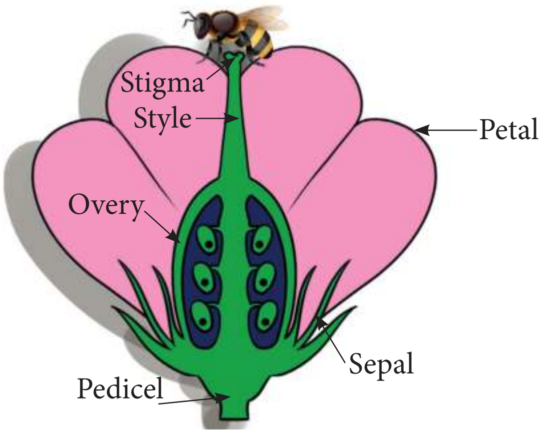
ACTIVITY 5

Using the information from the above diagram complete the following table:

Name of the flower	Complete / Incomplete	Unisexual / Bisexual	Male / Female
Hibiscus			
Pumpkin			
Rose			
Coconut			
Jasmine			



Bisexual Flower



Unisexual Flower

5.2.3 Pollination

We know that flowers of pumpkin are unisexual - that is some flowers are male while many are female flowers. We can easily identify the male and female flower of pumpkin, even before the buds bloom. To understand how a flower develops into fruit, let us perform an experiment on pumpkin plant.

ACTIVITY 6

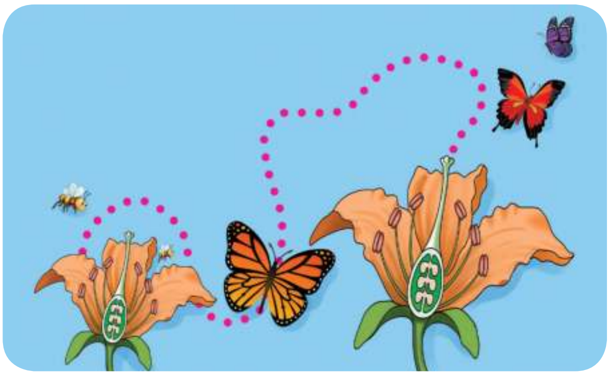
Once flower buds appear, immediately identify ten female flower buds from a pumpkin plant. Tie a plastic bag around each bud so that no outside material can enter inside. Ensure to make small holes with a pin to allow air flow. Wait for two to three days to bloom.

Female

Male

Choose three to four male flowers. Pluck the stamens of these flowers and dust the pollen grains in a sheet of paper and collect it. Open five out of ten bags containing female flowers. Brush the collected pollen grains on the stigma with a soft paint brush. Take care not to damage the stigma. After few days we can see that flower in all bags that were not opened at all would wilt without forming a fruit, while most of the flowers to which pollens have been applied bear fruits.

In the above experiment we transferred the pollen grains from male flower to the female flower. This is called as an **artificial pollination**. However, in nature there are many ways in which pollen grains reach the stigma of the flower and it is called as **natural pollination.**

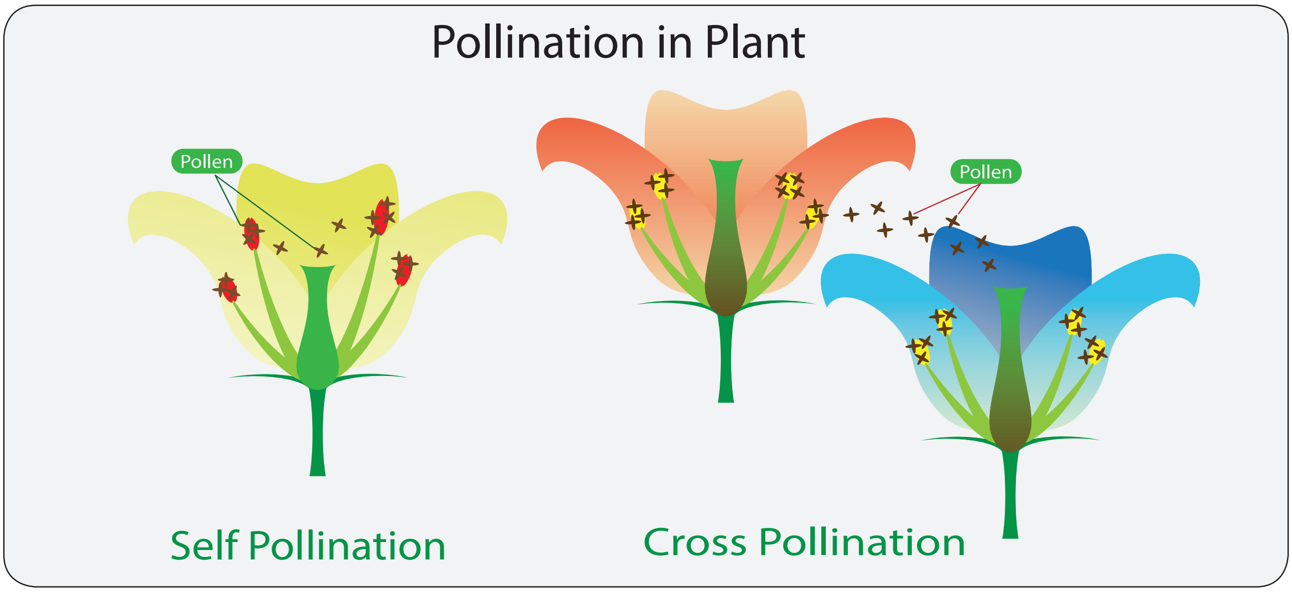


In some plants like grasses, pollen grains are light. Stamens shed pollen grains, and are carried by wind to other flower. Insects, birds are also agents of pollination. Bees, butterflies and variety of birds hover around flowers. They help to carry pollen from one flower to another. Pollen grains stick to their legs, wings or abdomen when they move from one flower to another. This is called as **cross pollination**

When you shake stamens, pollen grains fall. Thus, when wind shakes the flower or when a butterfly agitates the flower, pollen grains could fall onto the stigma of the same flower. Some plants that have both the male and female parts within a single flower (bisexual) pollinate by this means. This is called as **self pollination**.

Table 5.1 Differences between self pollination and cross pollination.

Self Pollination	Cross Pollination
Pollen grains are transferred from the anther to the stigma of the same flower.	Pollen grains are transferred from the anther of one flower to the stigma of another flower of the same plant or same variety.
Plants do not need to produce pollen grains in a large quantity for self pollination	Plants need to produce pollen grains in larger quantities to increase the chance of pollination.
It does not produce changes in the characteristics of new plants.	Cross pollination does introduce variations in the characteristics of new plants.



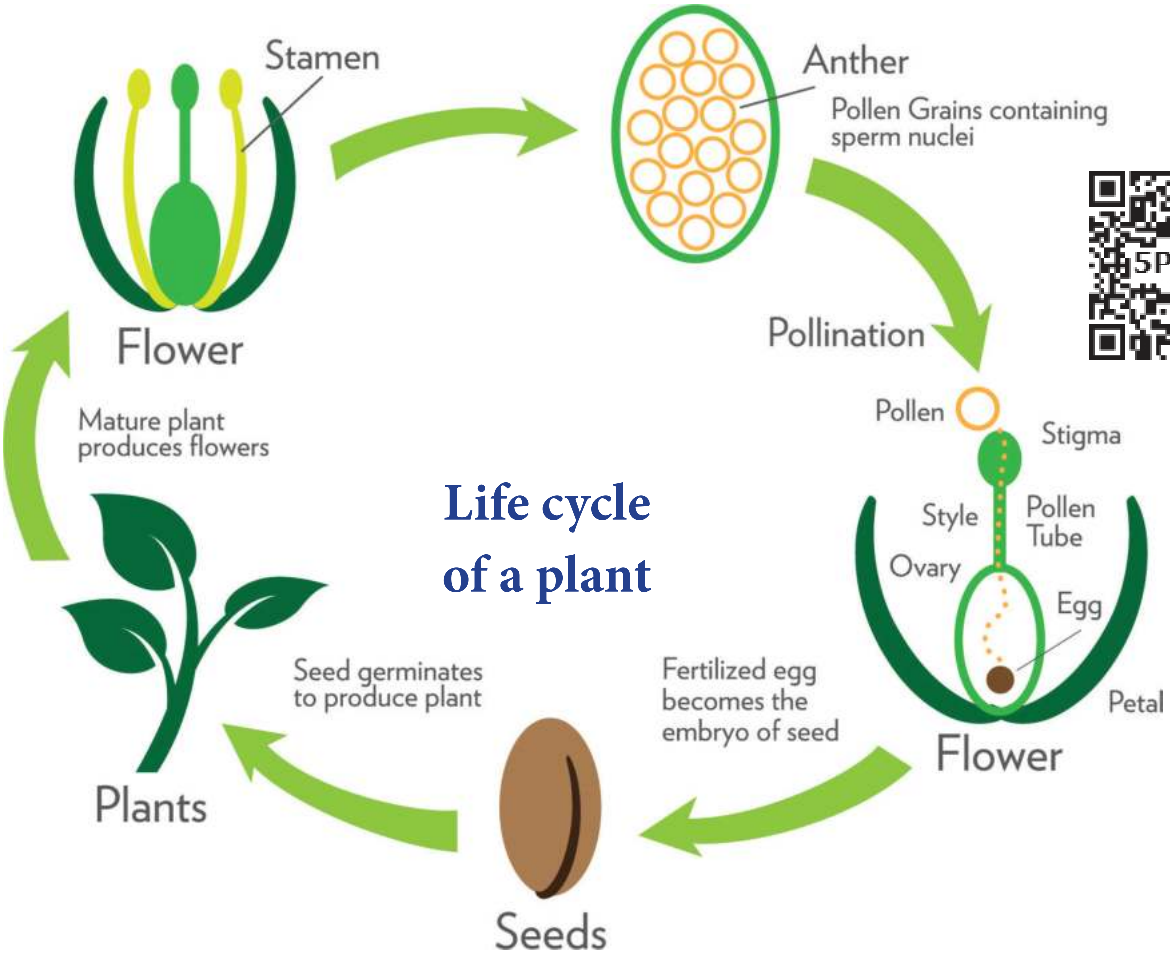
Beans (Fabaceae) and tomatoes (Solanaceae) commonly self-pollinate. Even though, for example, tomato self pollinate, they need the help of the insects to create vibrations within the flowers that will effectively loosen the pollen. Paddy is mostly self pollinating using just gentle wind as the pollinating agent. The agents that are helping in pollination are called **pollinators.**

In many plants, pollens have to come from some other flowers. This is obvious in case of plants which have distinct male and female flowers like pumpkin. In some flowers the gynoecium matures first before the androecium shed pollens. Such plants need cross pollination. Plants such as apples, plums, strawberries, pumpkins use insects for cross-pollination.

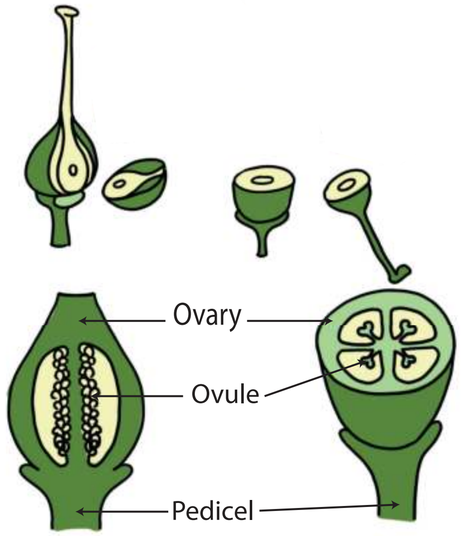
5.2.4 Fertilization

During pollination, pollen grains reach stigma. What happens to them after this? Substances produced on the stigma causes the pollen grain to germinate. During the germination a tube develops from the pollen grain which carries male gametes and ultimately reaches female gamete inside the ovary through the style. Male gamete fuses with the female gamete to form zygote. This process is known as **fertilization.**

Where is this female gamete located? Inside the ovary, small rounded structures, ovules are present. In these ovules, female gamete is present. To know more about this, we should cut ovary of a flower in longitudinal and transverse ways.



Cut a ovary of a flower both vertically and horizontally. Observe the ovules. Compare the ovary and ovules from few different flowers. Are there one or more ovules? Can you see any connection between the number of ovules in the ovary and number of seeds in each fruit?



Longitudinal Section of an Ovary **Transverse Section of an Ovary**

Collect some fruits like tomato, brinjal, lady's finger (vegetable), mango, peas and custard apple and observe. You can see some green part above brinjal and lady's finger. What are they?

Compare mango, custard apple and peas. All these are single fruits but custard apple has many small parts in it, each with a seed. Mango has a single seed and pea has many seeds. What do you understand from the above observations?

- A green part above fruits of **brinjal** and **lady's finger** are sepals of a flower. In some plants, after fertilization, sepal will not fall from fruit and remain or persist with fruit.
- **Custard apple** is made up of many fruits, aggregated together. Each fruit part is thin, membranous with some granule like, which is edible.
- In **mango** the outer skin and middle pulpy are edible and sweet. The inner most part is with single seed.
- In **pea** the fruit is not fleshy, but forms a covering pouch for many seeds.

In all the above fruits, ovary, a lower most swollen part of pistil develops into a fleshy fruit. Ovules present inside the ovary gets transformed into a seed.

Hence, now with these observations, we shall list the changes taking place in a flower after fertilization. These are collectively said to be **post fertilization changes**

- ❖ Calyx sometimes persist with fruit.
- ❖ Petals fall off.
- ❖ Androecium fall off.
- ❖ Pistil remain and develops into a fruit.
- ❖ Style and stigma fall off
- ❖ Ovary enlarges to store food materials and develops into a fruit.
- ❖ Ovules present inside the ovary develops into seeds.

DO YOU KNOW?

The world's largest and heaviest seed is the double coconut. The seed looks like two coconut fused together. It grows only in two islands of the Seychelles. A single seed may be 12 inches long, nearly 3 feet in circumference and weighs about 18 kg.

Orchids have the smallest seeds in the plant kingdom. 35 million seeds may weight only about 25 gram.

5.3 Asexual reproduction

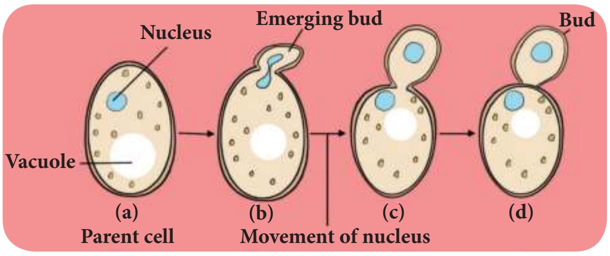
We saw that plants reproduce not only from seeds but by other processes as well. The production of new plants without the involvement of pollination and fertilization is known as asexual reproduction. Let us study the types of asexual reproduction.

5.3.1 Vegetative Propagation

In potato, shoot arise from eyes. Sugar cane and yam also grow like this. Vegetative parts of the plants such as root, stem and leaves can help to produce the plant.

5.3.2 Budding

When we go to a bakery we see so many types of cakes and breads. These are very soft in nature. This is due to the presence of yeast. Single yeast undergoes asymmetric division. It produces a small protuberance which gradually grow and detach from the parent cell. This process is called **budding**.

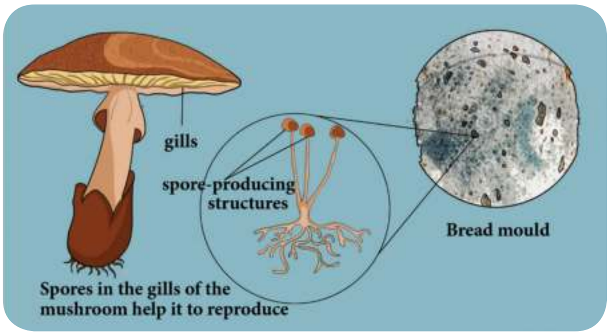


5.3.3 Fragmentation

In a pond we see so many algae. **Spirogyra** is a filamentous alga. When it matures, the filament divides into pieces. Each fragment or piece of a filament will grow into a new filament or individual. Likewise **spirogyra** produces so many young ones and this process is known as **fragmentation.**

5.3.4 Spore Formation

Scarcity of water, high temperature, nutrient deficiency in soil etc., are unfavourable conditions. During these conditions non-flowering plants like algae, fungi, moss and ferns produce spores. They germinate into a new plant when favourable conditions return.



5.4 Modifications of plant parts

Compare the given plants and discuss with your teacher.

Carrot Plant

Grass

Onion

Potato

Carefully remove a fresh carrot plant from the soil and observe it. Look at the part we usually consume as 'carrot vegetable'. It is not a unripe fruit, but the tap root of the carrot plant. We can see that the tap root of the carrot is swollen. In the case of the carrot plant, the tap root has a different characteristics than the usual plants. Normally, each plant organ originally evolves to meet certain needs of the plant. For example, roots evolve primarily to anchor the plant and also to absorb water and mineral nutrients from the soil.

Leaves are adapted to optimize photosynthesis. Stems evolve to reach out to sunlight and also to conduct water from roots to leaves. However in certain plant species, specific parts have evolved further in unusual and surprising ways to meet certain other specific needs, In some plants, root, stem, and leaves change their shape and structure to perform special functions like storage of food, mechanical support, protection and other vital functions. This is known as modification.

What appear as the 'leaf' of a cacti are actually their stem and what appear as 'spine' on them are actually leaf. Its leaves are modified into spines, an adaptation to reduce transpiration. Photosynthesis is performed by the stem part of the plant. In this section let us study about the modification of root, stem and leaves.

5.4.1 Modification of Root

a. Roots for storage

Look at radish, turnip, beet root, and carrot. They all grow under the soil. As soon as you pluck it from the ground if you wash them gently, you will notice small roots dangling from their surface. All these vegetables are in fact roots of the plant. Instead of thin slender roots, they have become a place to store the food produced by them. Hence, they are thick and swollen. One can notice that the tap root of radish is in the shape of spindle, swollen in the middle and tapering at both ends. Such type of modified roots are called spindle shaped root.

6RD14

Radish

At times, like in the case of turnip and beet root, the tap root can acquire a shape of top, that is spherical at the base and tapering shortly towards the apex. They are called as top shaped root.

Beet Root

In case of **carrot,** the shape is conical, broad at the apex and tapering gradually towards the base and such modified roots are called conical shaped root.

Carrot

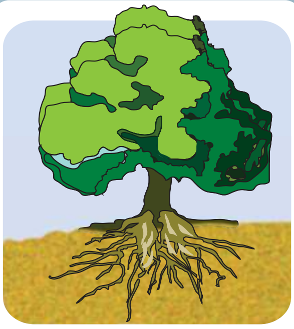
PLANT MODIFICATION

Modification of Root

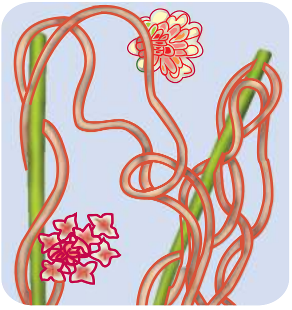
To perform special functions the roots change their size and shape.

STORAGE OF FOOD
e.g. Beet root

MECHANICAL SUPPORT
e.g. Banyan tree



GASES EXCHANGE
e.g. Avicennia

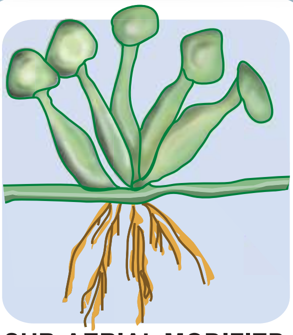


SUCKING ROOT
e.g.Cuscuta

Modification of stem

Stem modified for storing the food materials and for vegetative propagation.

AERIAL MODIFIED
e.g. Cactus

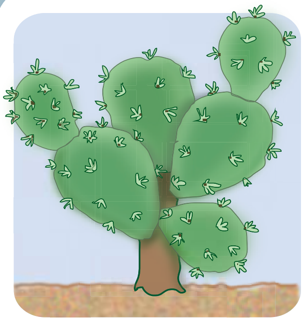


SUB-AERIAL MODIFIED
e.g. Eichhornia

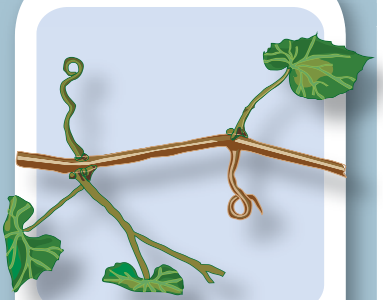
UNDERGROUND STEM
e.g. ColoCasia

Modification of Leaf

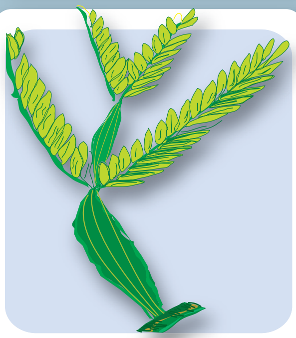
Leaves have changed themselves to adopt to their environment



SPINES
e.g.Opuntia



TENDRILS
e.g.Pisum



PHYLLODE
e.g. Acacia

TRAPS
e.g. Nepenthus

ACTIVITY 7

Aim: To study the modification of root.

Materials Required: Sample / Charts of radish, carrot, beet root, sweet potato, stilt roots and pneumatophores.

Procedure: Carefully observe the shape of each specimen.

Observation: Draw the diagram and observe the morphological differences between the samples.

b. Mechanical Support

Look at a banyan tree. It seems to have many trunk, supporting it. However many of them are actually roots. As the banyan tree is large and huge, it needs support so that it does not tilt and fall down. Many plants require such additional support. Such plants develop roots on their aerial parts to provide mechanical support. These roots grow downward and act as supportive organs. There are three types of modified roots for support.

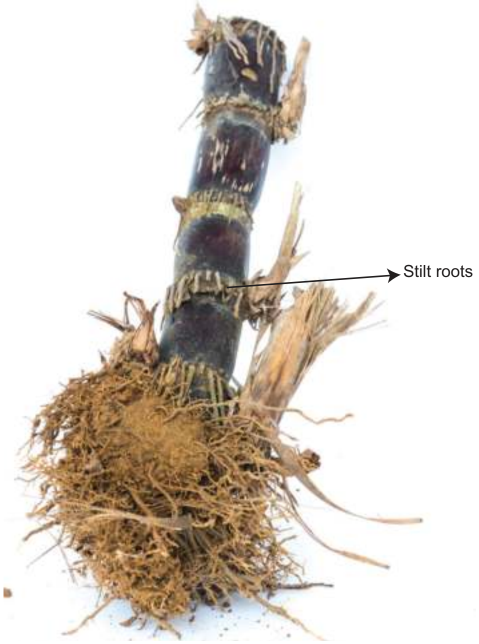
Prop roots

Roots are modified to provide mechanical support as seen in banyan tree. These roots grow vertically from horizontal branches of a tree.

Banyan

Stilt roots

In sugar cane and maize, adventitious roots arise from the nodes in cluster at the base of the stem. These roots are called stilt roots which give additional support.



Sugar cane

Climbing roots

In betel and black pepper, nodes or internodes bear roots which help in climbing.

Betel

DO YOU KNOW?

A root growing from a location other than the underground, such as from a stem or leaf is called as adventitious root

c. Breathing roots or Respiratory roots

Avicennia is a tree which grows in mangroves or swamps. They have roots which are seen above the ground for the purpose of gaseous exchange. These roots are erect, peg like structures with numerous pores through which air circulates. These roots are called **breathing roots or pneumatophores.**

Avicennia

> DO YOU KNOW?
>
> **Vanda** is an epiphytic plant, which grows on trees. The velamen tissue present in the epiphytic root absorbs moisture to perform photosynthesis.
>
>
>
>
> Vanda

d. Haustorial roots

Roots may also perform some special functions. Haustoria or **sucking roots**, are one such example. Cuscuta a parasite plant, climb the trees and other vegetation and use the haustorial roots to penetrate the tissue of the host plant and suck nutrients from them. They are usually found in parasitic plants that depend on the host plants for nutrients.

Cuscuta

5.4.2 Modification of stems

Can you guess what is common between ginger, onion bulb and potatoes. All three are stems. Some plants have their stems modified for storing food and for vegetative propagation. Modified stem may be aerial, subaerial or underground stems.

a. Aerial Modifications

Phylloclade

In dry climate, conserving water is a challenge. Water evaporates from the surface. If the surface area is larger, evaporation would be more and if the surface area is smaller, the evaporation will be less. Plants with many leaves have more surface area. **Cactus** hence

Cactus

has a thick stem which does most of the food production through photosynthesis and leaves are reduced to small spines with less surface area.

b. Sub – aerial Modifications

Stem of some plants remains sub – aerial which grow horizontally on the surface of the soil for the purpose of reproduction. There are four types.

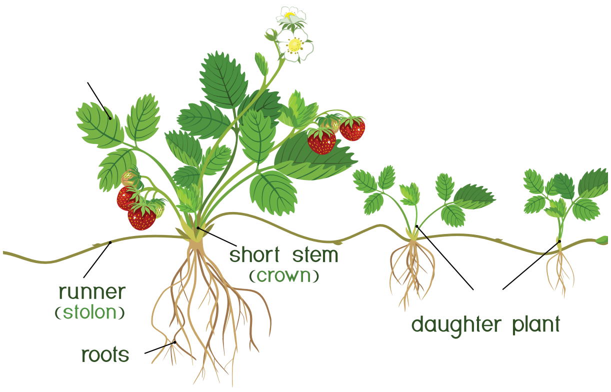
Runner

The stem which grows laterally on the surface of the soil, breaks up to produce roots where it touches the ground to give rise **to new plants. E.g. Centella (Vallarai)**

Centella

Stolon

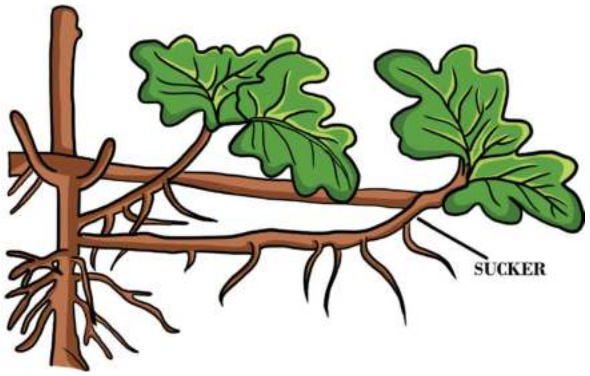
Stolon is a slender branch of the stem that grows upwards to some distance and then bends towards the ground. Upon touching the ground, it gives rise to a new plant. **E.g. Wild strawberry**



Wild strawberry

Sucker

Sucker is a short and weak lateral branch that grows diagonally upwards and directly gives rise to a new shoot. **E.g. Chrysanthemum**



Chrysanthemum

Offset

An offset is a short and thick branch that arises from the axial part of a leaf. It has thick internodes. It produces a tuft of leaves and cluster of small roots below. **E.g. Eichhornia**

Eichhornia

c. Underground modifications

In aerial and sub aerial modifications, stem has indefinite growth. In underground modified stem, whole stem is burried under the ground and it has definite growth. Usually stem grows above the ground, but there are some stems that grow under the ground to store food. These underground stems swell and become thick. There are four types of underground stems. They are:

1. Rhizome
2. Corm
3. Tuber
4. Bulb

1. Rhizome

It is an underground thick stem with nodes and internodes with scale leaves at the node. It grows horizontally and has an irregular shape. Rhizome have buds. It gives rise to new stem and leaves. **E.g. Ginger and Turmeric**

Turmeric

2. Corm

This underground stem is round in shape and flat at the top and bottom. It is a condensed form of rhizome and bears one or more buds in the axils of scale leaves. Daughter plants arise from their buds. **E.g. Colocasia**

Colocasia

3. Tuber

It is an enlarged, spherical underground stem that stores food. It has many dormant buds on its surface known as 'eyes'. If we plant a part of tuber with the bud, it grows into a new plant. **E.g. Potato**

Potato

4. Bulb

It is a condensed stem which is disc like and stores food in the fleshy leaves. The bulb has two types of leaves.

- Fleshy Leaves
- Scaly Leaves

The upper part of the stem has a terminal bud and it is covered by many scaly leaves. The inner fleshy leaves store food as seen in garlic and onion.

Onion

ACTIVITY 8

Aim: To study the modification of stem

Materials Required: Specimens of ginger, potato, onion, mint, bougainvillea, acacia, opuntia and locally available specimens.

Procedure: Observe the external morphology of each specimen.

Observation: Draw diagram and bring out the differences and their function in each type of stem modifications.

5.4.3 Modifications of Leaf

Plants have changed themselves to adapt to the environment they grow. One of them is the modification of leaves. Leaves of several plants get modified into different form based on the purpose and environment.

1. Spines

Leaves are reduced to spines, and the stem is modified into green succulent part to perform photosynthesis. **Eg. Opuntia**

Opuntia

2. Tendrils

In climbers, the leaf of plant are modified into elongated structure to help the plants climb efficiently.

- ***Gloriosa superba*** – Leaf tips are modified into tendrils.
- ***Pisum sativum (Pea)*** –Terminal leaflets are modified into tendrils.

Pisum sativum

3. Phyllode

In Acacia auriculiformis, petioles expand to form leaf like structure. They carry out the function of leaf (Photosynthesis).

Acacia

4. Traps

Plants that grow in nitrogen deficient places adapt themselves well to get it. In **Nepenthes,** the leaves are modified into a flask like structure, which is used to attract insects and other tiny animals. The inner wall of the leaf secretes digestive enzymes that help to digest the insects and extract the nitrogen needed for the plant.

Nepenthes

Points to Remember

- ❖ Reproduction is an essential function of living organisms. In plants there are two types of reproduction – asexual reproduction and sexual reproduction.
- ❖ In flowering plants, flowers are the reproductive organs. They produce fruits and seeds through pollination and fertilization.
- ❖ The male reproductive organ of a flower is androecium and the female reproductive organ of a flower is gynoecium.
- ❖ Transfer of pollen grains from the anther to stigma is called pollination. There are two types of pollination - self pollination and cross pollination.

- Agents like wind, water, insects and animals are helpful for pollination and are known as pollinators.
- After pollination, the fusion of male and female gametes takes place. It is called fertilization. After fertilization, ovary becomes the fruit and ovule becomes the seed.
- To perform the special function other than the normal function, the root, stem and leaf externally modify themselves according to the environment. So, they change their size, shape and colour. These are called the modification of root, stem and leaves.

Evaluation

I. Choose the appropriate answer.

1. Vegetative propagation by leaves takes place in

   a. bryophyllum b. fungi

   c. virus d. bacteria

2. Asexual reproduction in yeast is

   a. spore formation b. fragmentation

   c. pollination d. budding

3. Reproductive part of a plant is

   a. root b. stem c. leaf d. flower

4. Pollinators are

   a. wind b. water c. insect d. All the above

5. Climbing roots are seen in

   a. betel b. black pepper

   c. Both of them d. None of them

II. Fill in the blanks.

1. The male reproductive part of a flower is ________.
2. ________ is the basal swollen part of the gynoecium.
3. After fertilization the ovule becomes ________.
4. Breathing roots are seen in ________ plants.
5. Onion and garlic are example for ________.

III. State true or false. If false, correct the statement.

1. A complete flower has four whorls.
2. The transfer of pollen to the stigma is known as pollination.
3. Conical shaped root is carrot.
4. Ginger is an underground root.
5. Leaves of Aloe vera are fleshy and store water.

IV. Match the following

Petal	Opuntia
Fern	Chrysanthemum
Phylloclade	Attracts insect
Hooks	Spore
Sucker	Bignonia

V. Answer very briefly.

1. Write two types of reproduction in plants.
2. What are the two important parts of a flower?
3. Define – Pollination.
4. What are the agents of pollination?
5. Give example for Corm and Tuber
6. What is tendril?
7. What are thorns?

VI. Answer briefly.

1. Differentiate bisexual flower from unisexual flower?
2. What is cross pollination?
3. Write notes on phyllode.

VII. Answer in detail.

1. Write a brief account on pollination.
2. Explain the underground stems.

VIII. Higher Order Questions.

1. Ginger is considered to be a stem, not a root. Why?
2. What will happen if pollen grain of rose gets deposited on stigma of lily flower? Will pollen germination takes place? Why?

IX. Consider the following statements and choose the correct one.

1. **Assertion**: Pollination and fertilization in flowers produce fruits and seeds.

   Reason: After fertilization the ovary becomes fruit and ovule becomes seed.

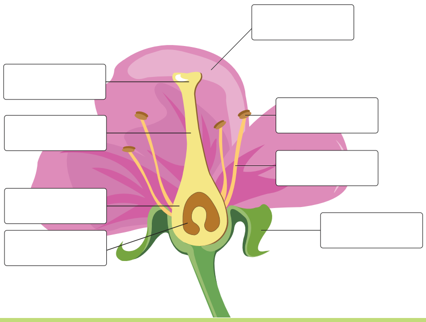
2. **Assertion**: An example for conical root is carrot.

   Reason: It is an adventitious root modification.

a. Assertion is incorrect, Reasoning is correct.
b. Assertion is incorrect, Reasoning is incorrect.
c. Assertion is correct, Reasoning is correct.
d. Assertion is correct, Reasoning is incorrect.

X. Picture based question.

i. Label the picture given below.



Stigma	Pistil	Filament	Ovule	Sepal	Stamen
Petal	Style	Anther	Ovary		

ii. Identify the four plants shown in the following table. Name the different modifications in each of them.

Name	Modification
Garlic	
Turnip	
Rose plant	
Maize	

ICT CORNER

Reproduction and Modification in Plants

Let's label the parts of the flower.

PROCEDURE :

Step 1: Use the URL to reach stimulation page. Click 'Run adobe flash' to launch the simulation.

Step 2: Select 'OK' button to run the activity.

Step 3: Drag a Stamen into the labelled box. Then click 'OK' button.

Step 4: Read the instructions at the top of the screen to do the activity.

Step 5: Click 'Reset' to refresh.

Step 1

Step 2

Step 3

Step 4

Reproduction plants URL:

http://www.sciencekids.co.nz/gamesactivities/lifecycles.html

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.

Unit 6

Health and Hygiene

Learning Objectives

After studying this unit, students will be able to:

- ❖ describe ways to take care of the body.
- ❖ know how to take care of the teeth, eye, hair and follow the hygienic habits.
- ❖ understand the communicable and non-communicable diseases.
- ❖ know and understand some common ailments and the remedies for them.
- ❖ know first aid and safety measures.

Introduction

Have you ever taken leave from the school due to sickness? What happens exactly when we become sick? Sometimes, we feel good even without taking any medicines and sometimes we need to consult a doctor and take regular medicines to be healed. Why is it so?

To prevent and treat sickness successfully, it is necessary to have complete understanding of the common sicknesses in the area and the combination of things that caused them. This lesson may help you to understand the various causes of sickness. In this lesson we are going to study about health and hygiene, care of the body, dieseases, health problems of children and safety.

6.1 Hygiene

Health is the best wealth. If you have good health, you will have a sound mind and you will gain good knowledge and wealth also. Health refers to a state of a sound mind and body free from any sickness or ailment, stress and problems. In simple words, health refers to the physical, emotional and psychological well-being of a person. To maintain good health, you should follow good hygiene, eat nutritious food, do exercise, take rest and have a sound sleep.

Hygiene refers to the good habits and their practices which are followed to prevent diseases, maintain good health, especially through cleanliness, consumption of safe drinking water and proper disposal of sewage. It refers to all those activities that are done for improving and maintaining good health and sound mind.

Maintenance of personal and environmental hygiene is called cleanliness. In simple words, it refers to the state of being clean which is essential for good health. To protect us from diseases it is essential to maintain good health by taking regular bath, cleaning the clothes and surroundings and also avoiding unhygienic food consumption.

6.1.1 Personal hygiene

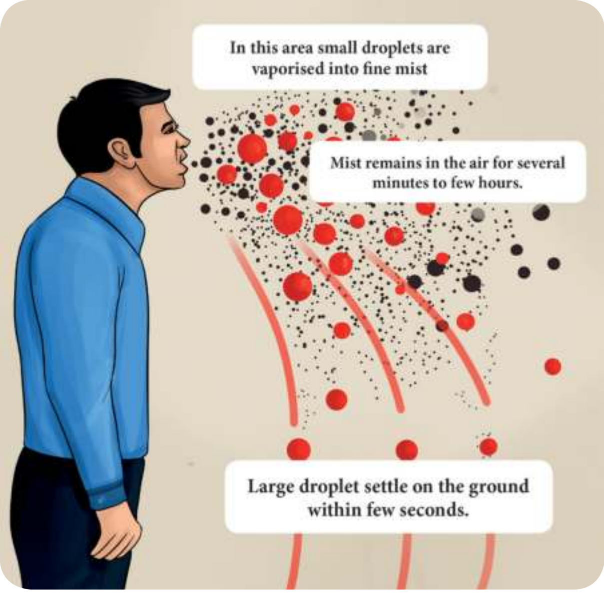
Personal hygiene is defined as the branch of health which is concerned with the individual's adjustment to the physiological needs of the body and mind for the attainment of the maximum level of health. It also refers to the cleaning and grooming of the body.

62F35

Cold and flu are some of the common communicable diseases. They are caused not only by bacteria but also by virus. When you have cold and flu, you may also have running nose, cough, sore throat, and sometimes fever or pain in the joints. For some, this condition may also lead to mild diarrhoea.

What will happen, if cold affected friend/classmate of you, sneezes or cough in front of you? When he sneezes some secretions may come out of his nose. Secretions oozing out

from the nose may contains the bacteria or virus. When the patient touches some other object or someone else after touching the nose, the virus is transferred. When the patient sneezes or coughs the virus comes out with the droplets and become airborne. Hence, it is a good practice for the patient with cold and flu to use a hand kerchief to blow the noses and also wash the hands often to ensure that they do not accidentally spread the virus to others.



ACTIVITY 1

List out your daily activities in the given table.

Activities	Number of times in a day
Brush teeth	
Take shower	
Wash hair	
Wash hands and feet	
Wearing Clean clothes / Uniforms	

Do you follow personal hygiene properly? How these activities will keep you physically fit?

6.1.2 Community Hygiene

A community is formed by a group of people living together in a particular area. If the people in a community wish to lead a healthy life, they should maintain basic community hygiene. It can be done by adopting the following measures.

- The surroundings should be kept clean.
- Drains should be covered properly.
- Used water from houses should not be let out into open drains or open areas.

DO YOU KNOW?

Dengue is spread by mosquitoes of Aedes aegypti caused by DEN-1, 2 virus belonging to the type - flavivirus. It decreases the counting of the blood platelets of human blood and it has a maximum flight range of 50–100 metres in and around the places.

ACTIVITY 2

Observe the picture and write remedial measures

- The domestic wastes should be segregated and properly disposed off safely in separate dust bins provided by the government (Green and Blue).

6.2 Care of the body

Human body is a massive miracle. It consists of organs and systems, which function continuously. Our body is compared to a machine. Human body works well with proper maintenance and guidance. For smooth functioning, all the parts of the body should work in unison. The digestive system, circulatory system and muscular system are the core systems that should be in synchronization and function well. We need to keep them well by proper care.

6.2.1 Dental Care

Dental care or broadly speaking oral hygiene is an important aspect of the personal health of an individual. Good oral hygiene implies sound teeth and healthy gums with healthy surrounding tissues. The physical act of chewing food promotes saliva and gastric secretions which help digestion. The act of chewing and tasting is called 'mastication'. It gives pleasure and emotional satisfaction of eating food. Teeth is essential for good appearance and clear speech also.

- Brushing two times a day, will prevent the formation of tartar and plaque on your teeth and gums.
- When you floss, it will remove food particles, plaque and bacteria which build up between your teeth (When you start flossing, your gums may bleed a little bit, but after few days that will be stopped. It should be started only with proper medical guidance).

Diseases affecting the teeth

Failure to have oral hygiene results in diseases affecting the teeth. Some of the diseases affecting the teeth and gums, their causative agents and remedial measure are given below in the table.

6.2.2 Eye Care

Eyes are an important organ of our body. They are considered as windows to the world. Eyesight is the most important sense. 80% of what we perceive comes through the sense of sight. Protecting the eyes, can

Table 6.1 Diseases affecting teeth

Sl. No.	Name of the Diseases	Causative Agents	Impacts / Consequences	Remedial measures
1	Bleeding gums	Vitamin C deficiency	Bleeding of the gums	Eating citrus fruits
2	Tooth decay	Bacteria in teeth	Bacteria produce acids	Brushing and flossing the teeth can prevent decay.
3	Periodontitis	Tobacco chewing	Severe form of gum disease ruin the bones, gums, and other tissues	Chewing type of tobacco should be avoided. Eat a well-balanced diet.

reduce the odds of blindness and vision loss. We should protect our eye from the diseases, surroundings and climate condition.

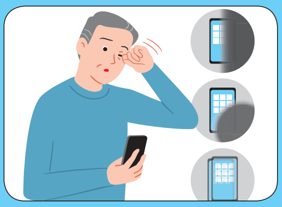
Diseases affecting Eye

Diseases affecting the eyes and the remedial measures are given below.

Table 6.2 Diseases affecting eye

S.No.	Name of the Disease	Causative Agents	Impacts/Consequences	Remedial measures
1.	Night Blindness	Lack of vitamin A. Disorder of the cells in your retina	Makes it hard to see well at night or in poor light.	Eat foods rich in vitamins like carrots, papaya.
2.	Conjunctivitis (Pink eye)	Caused by a virus and bacteria	One or both eyes can be affected. Highly contagious; can be spread by contamination and sneezing.	Antibiotic eye drops or ointments, home remedy
3.	Colour blindness	Genetic condition	• Difficulty in distinguishing between colours. • Inability to see shades or tones of the same colour.	There is no known cure for colour blindness. Contact lenses and glasses with filters.

ACTIVITY 3



Observe the pictures and tick do's and don'ts in the given tables

Sl . No.	Practices	I Do	I Don't do
1.	Do you rub the eyes?		
2.	Do you watch TV/work on computer for a long time?		
3.	Do you use cold water for cleaning your eyes?		
4.	Do you like eating carrot?		
5.	Do you regularly eat fruits like orange, sweet lemon and lemon?		

In the above checklist what do you understand?

6.2.3 Hair Care

The condition of the hair reflects to some extent the nutritional status and general health of the body. Thin, sparse hair and the loss of hair indicates a poor nutritional status. The deficiencies in diet, physical and mental illness of various kinds may also lead to premature greying of hair.

The hair follicles from which the hair grows produce oil which keeps the hair smooth. The sweat and the dead skin cells come off the scalp. The oil, sweat and dead cells all add together and can make the hair greasy and look dirty unless it is washed regularly.

Keeping hair clean and healthy

- Regular hair wash and massage of the scalp will remove the dead skin cells, excess oil and dust.
- Rinsing the hair well with clear water and using good toothed comb for hair dressing is highly essential for the maintenance of hair.

6.3 Diseases

A disease is the functional or physical change from a normal state that affects the health of a person by causing disability or discomfort. The following are the conditions that could lead to the development of disease in an individual.

- Infection caused by disease-causing microbes.
- Lack of balanced diet.
- Poor lifestyle and unhealthy habits.
- Malfunctioning of one or more body parts or organs.

The prevention and treatment of diseases can be considered in two groups for their better understanding. They are communicable and non-communicable disease.

6.3.1 Communicable Diseases

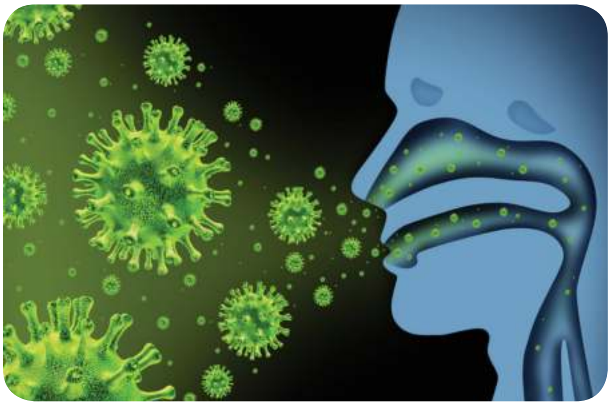
Communicable diseases are those diseases that spread from one person to another. Healthy persons must be protected from people with communicable diseases. Diseases spread through contaminated air, water, food or vectors (insects and other animals).

a. Diseases caused by Bacteria

Communicable diseases like tuberculosis, cholera and typhoid, are caused by bacteria. These diseases spread through air, water and some other organisms.

1. Tuberculosis

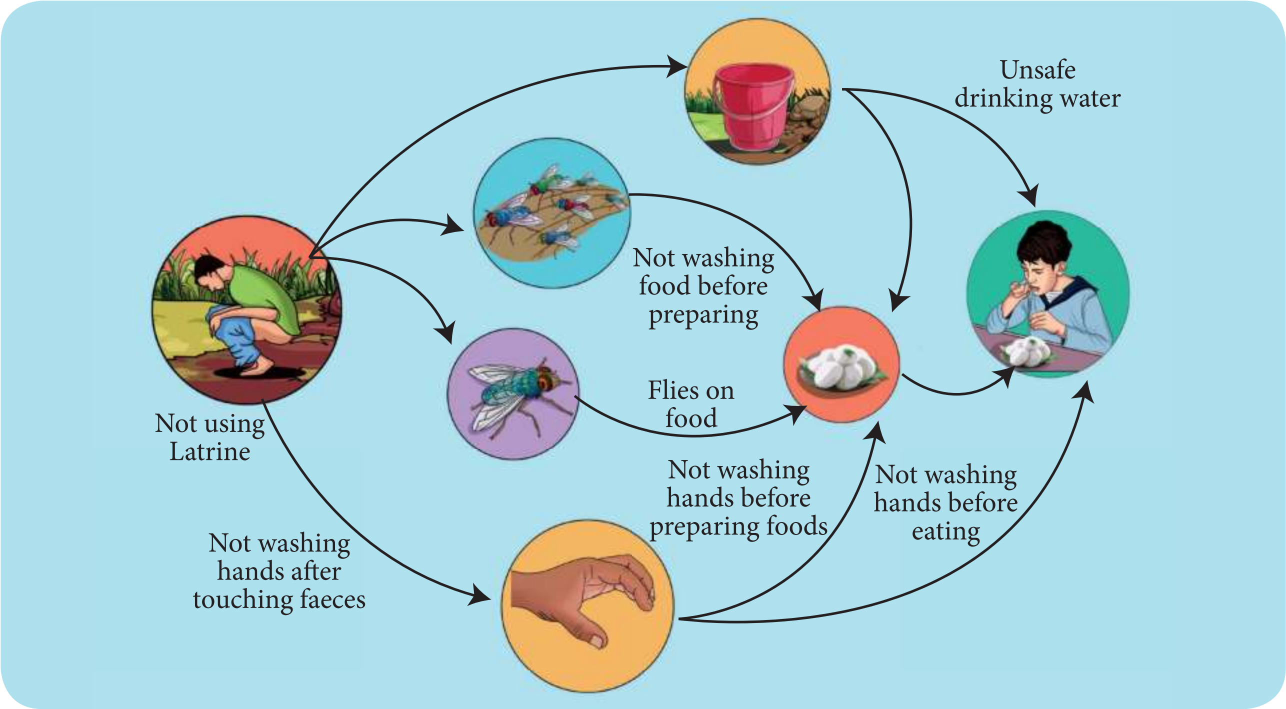
Tuberculosis (TB) is caused by ***Mycobacterium tuberculae*** and spreads from one person to another person through air, spitting, prolonged contact and sharing materials of the patient. The symptoms are fever, weight loss, chronic cough, bloody spitting and difficulty in breathing.



Mycobacterium tuberculae

Prevention and treatment

- BCG vaccination.
- Giving special attention to the patient.
- Regular medication like DOT.



2. Cholera

Cholera is caused by Vibrio cholerae and spread through the consumption of contaminated food or water. The symptoms of cholera is vomiting, severe diarrhoea and cramps in legs.

Vibrio cholerae

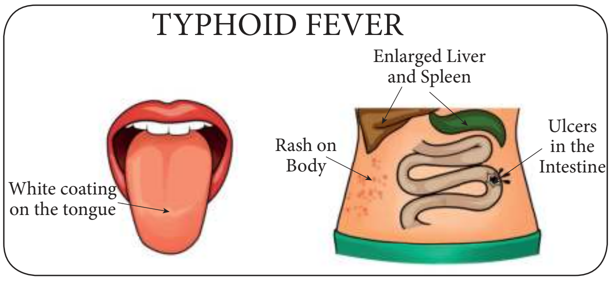
Prevention and treatment

- Good hygienic practices like washing hands before eating.
- Avoid eating uncovered food from street vendors.
- Drinking boiled water.
- Getting vaccination against cholera

3. Typhoid

Typhoid is caused by *Salmonella typhi* and spreads by contaminated food and water. The symptoms are anorexia, headache, rashes on abdomen, dysentery and high fever up to 104°F.

Salmonella typhi



Prevention and treatment

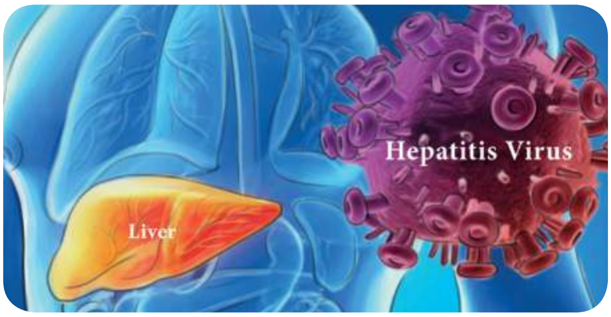
- Drinking boiled clean water
- Proper disposal of sewage
- Vaccination

b. Diseases caused by Virus

Viral diseases are extremely widespread infections caused by many type of viruses. Some diseases caused by viruses are hepatitis, chickenpox and rabies.

1. Hepatitis

Hepatitis is one of the most dangerous and fatal diseases caused by Hepatitis virus- A, B, C, D, E. Its mode of transmission is contaminated water, sharing of needles and blood transfusion. The symptoms of hepatitis is loss of appetite (anorexia), vomiting, eyes and urine turning to yellow colour.

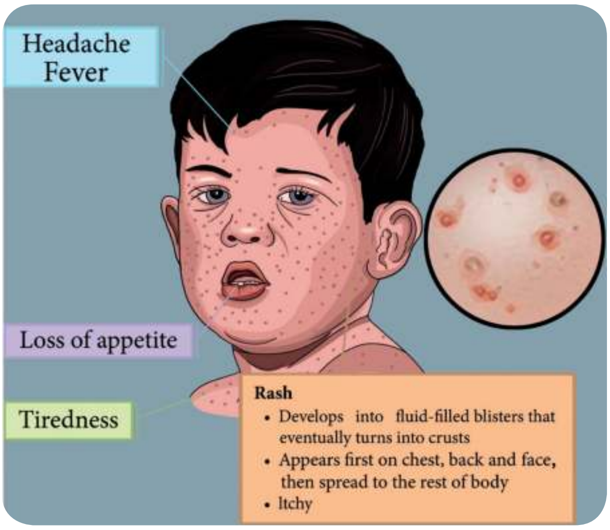


Prevention and treatment

- Drinking boiled water
- Proper cleaning of hands

2. Chickenpox

Chickenpox also known as varicella is a highly contagious infection caused by the varicella zoster virus. This disease spreads through air and contact with an infected person. Its symptoms are appearance of rashes on the whole body, fever, headache and tiredness.



Prevention and treatment

- The chickenpox (varicella) vaccine is the best way to prevent chickenpox
- Special attention should be given to the infected persons.

c. Rabies

Rabies is a fatal disease which is transmitted by the bite of the infected dog, rabbit, monkey, cat etc. The virus present in the saliva of dog enters the brain via neurons. The symptoms of rabies are hydrophobia (extreme fear for water), fever for 2 – 12 weeks and exaggerations in behaviour.

Prevention and treatment

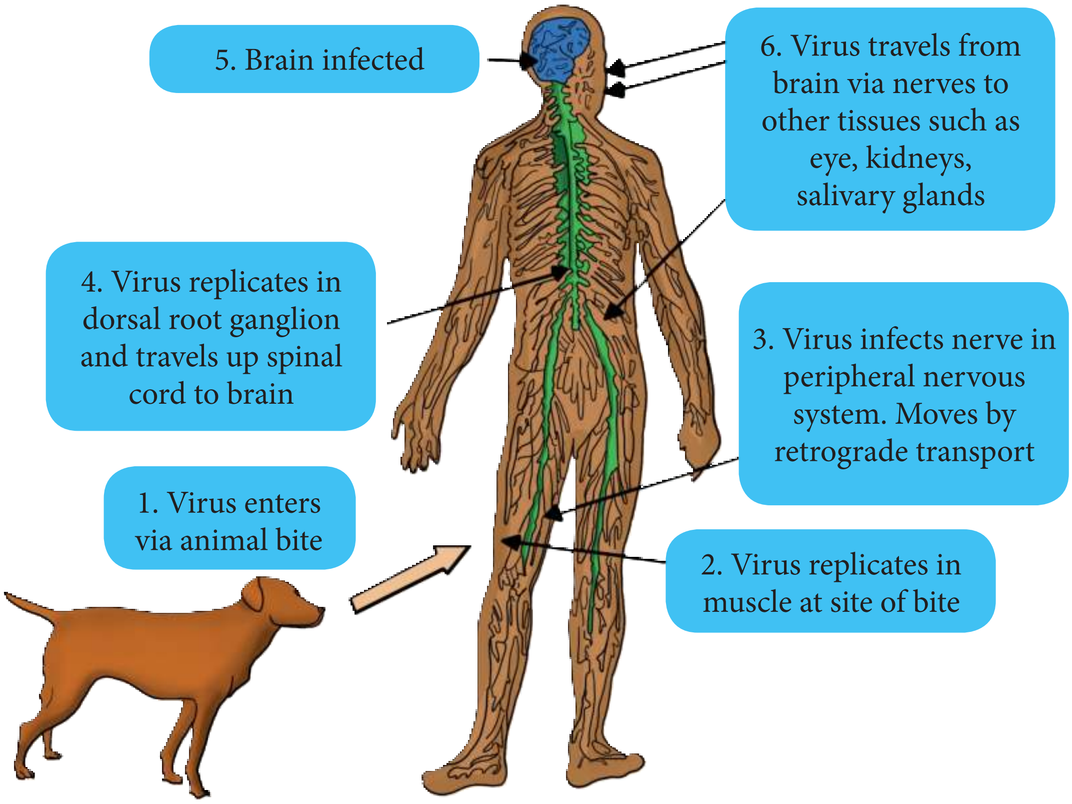
- In early stages rabies is very difficult to detect.
- After an animal is bitten it usually takes two to twelve weeks to show any symptoms and it may take as long as two years also.
- Fatality can be prevented by timely vaccination before the onset of symptoms.

ACTIVITY 4

Visit a nearby Primary Health Centre and collect information about vaccination given to children of 0-15 years. Meet a doctor or a health worker in the hospital and enquire about the following.

- The types of vaccines available there.
- Can disease be prevented by their usage?
- The age at which it should be given.

Rabies



> **DO YOU KNOW?**
>
> **Vaccine**
>
> Vaccine is a biological preparation that provides active acquired immunity to a particular disease. Vaccines like (BCG, Polio, MMR) are given at early childhood to protect from other diseases.

6.3.2 Non-communicable diseases

Non-communicable diseases do not spread from person to person. They are caused by other factors. Therefore, it is important to know which diseases are communicable and which are not. They are never caused by germs, bacteria, or other living organisms that infect the body. Antibiotics or medicines that fight against germs do not help to cure non-communicable diseases. Some of the non-communicable diseases are explained below.

a. Wearing out of body parts

Rheumatism, heart attack, epileptic seizures, stroke, migraine headache, cataract and cancer.

b. External harmful agents entering the body

Allergies, asthma, poisons, snakebite, cough from smoking, stomach ulcer, alcoholism.

c. Lack of trace elements in the body

Anemia, pellagra, night blindness and xerophthalmia, goiter and hypothyroidism.

d Malnutrition

Nutritious food is needed for a person to grow well, work hard, and stay healthy. Many common sicknesses are caused by malnutrition.

Leucoderma is a non – communicable diseases caused by partial or total loss of pigmentation in the skin **(melanin pigment).** This condition affects people of any age, gender and ethnicity. There is no cure. It does not spread by touching, sharing food or sitting together.

6.4 Specific health problems of children

Anaemia

It is caused by eating food with less iron content and can also be caused due to feeding some other foods instead of breast milk. Severe anaemia in children may lead to hookworm infection, chronic diarrhoea and dysentery. In the recent days, school going children, especially girls are affected by anaemia. The Government of Tamil Nadu provides iron folic tablets to all the girls in the schools of all areas every week.

The signs of anaemia

- Pale or transparent skin, the inner surface of eye lids are pale, white fingernails, pale gums, weakness and fatigue.
- In severe cases, face and feet may be swollen, the heart beat is rapid and with shortness of breath.
- Children and women who eat mud are usually anaemic.

Treatment and prevention of anaemia

Anaemia can be preventing by takes proper food and diet.

As a general rule, iron supplements should be given orally, not to be injected, because it is dangerous.

Food

Moringa leaves, dates, liver (sheep and chicken), green, green leafy vegetables like beans, peas, lentils and greed banana.

Pills

Cod liver oil tablet, Ferrous sulphate.

6.5 Safety and First Aid

First aid is the immediate treatment given to the victim of trauma or sudden illness before medical help is made available. First aid is important for following reasons.

- It saves the life.
- It prevents further bleeding and determine the condition of the patient.
- It relieves the pain.
- It provides a medical care available at the earliest.

6.5.1 Burns

The tissue damage caused by heat, chemical, electricity, sunlight or nuclear radiation is known as burns. Mostly burns are caused by scalds, building fires, flammable liquid and gases. There are three types of burns, according to degree of burning.

- First-degree burns affect only the outer layer (called the epidermis) of the skin.

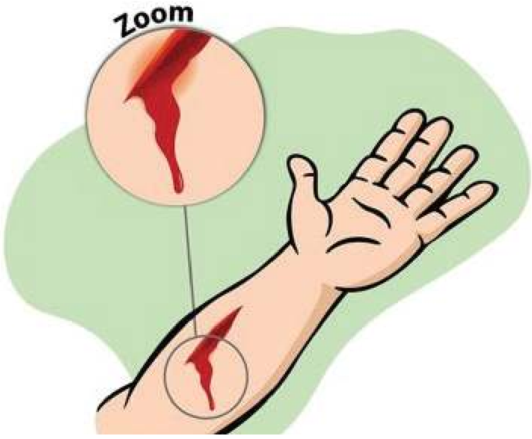
- ➢ Second-degree burns damage the epidermis and the layer beneath it (called the dermis).
- ➢ Third-degree burns involve damage or complete destruction of the skin to its full depth and damage to underlying tissues also. People who experience such burns often require skin grafting.

First aid for Burning

In case of minor burns, the affected area should be washed with cold water and an antiseptic cream should be applied. In case of severe burns, where deeper layers of tissues get destroyed and blisters appear, use of water should be avoided. The burnt area should be covered with a clean non-sticking cloth or bandages. Larger burns need immediate medical attention. It is very important to keep a fire extinguisher readily available.

6.5.2 Cut and Scratches

Cuts and scratches are the areas of damage on the surface of the skin. A cut is a line of damage that can go through the skin and into the muscle tissues below, whereas a scratch is surface damage that does not penetrate the lower tissues. Cuts and scratches may bleed or turn red, become infected and leave scars.



First aid for cuts

For minor cuts, the affected area should be washed with cold running water and cleaned with an antiseptic liquid. Then an antiseptic cream should be applied on the wound and sterilized bandage should be tied to prevent infection. If the cut is deep, a clean cotton pad should be placed on the cut and pressed, and the injured person should be taken to a doctor immediately.

6.6 Basic cleanliness and protection

The most important thing is to help anybody, but you must also protect yourself from HIV and other blood-borne diseases

when you help someone who is bleeding. You should wear gloves or a clean plastic bag on your hands. Be careful not to prick yourself with needles or other sharp objects around the person you are helping.

Points to Remember

- ❖ Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
- ❖ Diseases that are caused by pathogens and can be transmitted from an infected person to a healthy person directly or indirectly are called communicable diseases.
- ❖ Diseases that are not caused by pathogens and cannot be passed on by a sick person to a healthy person are called non-communicable diseases.
- ❖ First Aid is the immediate care given to a patient before a medical person arrives.

Evaluation

I. Choose the appropriate answer.

1. Ravi has sound mind and physically fit body. It refers to
   a. hygiene　　b. health
   c. cleanliness　　d. wealth
2. Sleep is not only good for our body, but it is also good for
   a. enjoyment　　b. relaxation
   c. mind　　d. environment
3. Our living place should be
   a. open　　b. closed
   c. clean　　d. unclean / untidy
4. Tobacco chewing causes
   a. anemia　　b. periodontitis
   c. tuberculosis　　d. pneumonia
5. The first aid is to
   a. save money　　b. prevent scars
   c. prevent the medical care
   d. relieve the pain

II. Fill in the blanks.

1. A group of people living together in a particular area is called ___________
2. I am green colour box with garbage. I am ________ .
3. Eyes are considered as ___________ to the world.
4. The hair follicles produce ___________ which keeps the hair smooth.
5. Tuberculosis is caused by the bacterium ___________.

III. State true or false. If false, correct the statement.

1. All food should be covered.
2. Chicken pox is also known as leucoderma.
3. Stomach ulcer is a non- communicable disease.
4. Rabies is a fatal disease.
5. First – degree burns damage the whole skin.

IV. Match the following.

Rabies	Salmonella
Cholera	Yellow Urine
Tuberculosis	Cramps in legs
Hepatitis	Hydrophobia
Typhoid	Mycobacterium

V. Analogy.

1. First degree burn : Epidermis :: Second degree burn : ______________
2. Typhoid : Bacteria :: Hepatitis : _________
3. Tuberculosis : Air :: Cholera : ___________

VI. Consider the following statements and choose the correct option.

1. **Assertion**: Oral hygiene is good.

   Reason: Sound teeth has healthy gums with healthy surrounding tissues.

2. **Assertion**: Chicken pox is a viral communicable disease.

   Reason: It is characterized by rashes on the whole body, fever, head ache and tiredness.

   a) Both A and R are true

   b) Both A and R are false

   c) A is true but R is false.

   d) A is false but R is true.

VII. Answer very briefly.

1. What is hygiene?
2. Write about the right way of protecting the eyes.
3. How to keep your hair clean and healthy?
4. Sobi frequently plays with her mobile. Suggest your ideas to protect her eye from irritation?
5. Give any two communicable diseases, which spread in your locality during monsoon.
6. What first aid will you provide in the case of bruises?
7. Ravi said, Ganga had minor burn, so I washed it with water. Do you agree with his statement? Explain, why?

VIII. Answer briefly.

1. Why first aid is essential?
2. What steps you will follow to keep your teeth healthy?
3. What does this picture mean?

4. Distinguish communicable diseases and non-communicable diseases.
5. Name the mode of transmission of communicable diseases.
6. Your friend says that her hair is thin, spares and lost very often. Suggest your ideas to reduce this problem.

IX. Answer in detail.

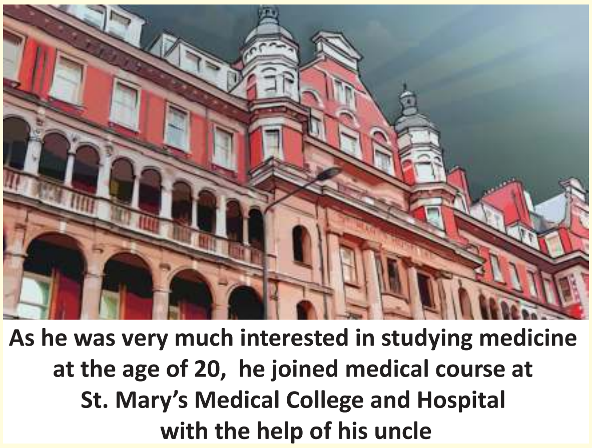
1. Write about any three communicable diseases in detail.
2. List the situations in which first aid is given. What would you do if a person suffers from skin burns?
3. How the diseases are transmitted from one person to the other person?

X. Higher order thinking question.

A person is sleeping during day time. Why does this happen to some people that they feel sleepy during day time in office or in the classroom? Have you ever come across such situation? Explain.

Queen of Medicines – Penicillin

Alexander Fleming
(1881 - 1955)



They were neither cured even after applying antiseptics nor their wounds healed
These germs have spread to others too!
The antiseptics reduced immunity. They spread bacteria. So an alternative to this was to be discovered
I cultured staphylococci bacteria in these culture media
What? In this culture media, a mould is formed but and I could not see staphalococci bacteria!
What a surprise! (after the research) Penicillin produced by the fungus Penicillium notatum destroyed the bacteria
The world's first antibiotic penicillin was discovered in 1928. "We are happier in curing millions of soldiers than getting the Nobel prize"
Penicillin cured Pneumenia, Diphtheria and infected wounds. Alexander saved the life of many soldiers and prevented the communicable disease by using penicillin. later, penicillin is used as the universal antibiotic. The discovery of Alexander is known as the 'Queen of Medicines' as the provided great benefits in the field of medicine

Unit 7

Computer - Visual Communication

Learning Objectives

After learning the lesson, students will be able to:

- differentiate a file from a folder
- know how to create a file and a folder
- use the system application like 'paint' to create images.
- use the system application like 'photo story' to create video from images.

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Introduction

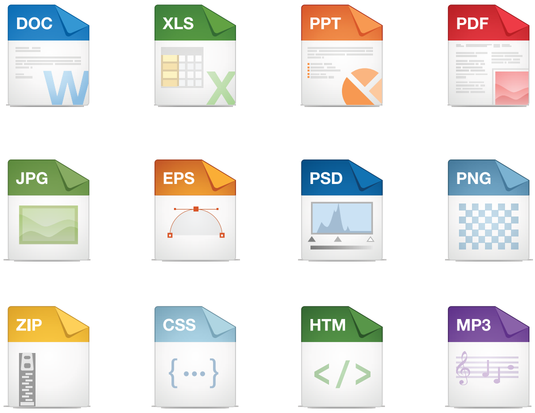
In general, whenever we think of computers, the things that come to our mind are computer screen, keyboard, mouse and CPU. We have learnt about computer and the parts of a computer as introductory part in standard VI. Apart from them, software and hardware also play vital role in the working of computer. Now, we shall learn how to operate the computer.

7.1 File and Folder

The reason we prefer computer is its speed and the ability to store data. How can we save data and information in computer? We can save them in folders which accommodate multiple files or a single file. Let us understand the terminologies like file and folder before moving further.

7.1.1 File

The output we get from any application is commonly referred as 'file'. Therefore, the application for the specific purposes determines the nature of the file.



Files

7.1.2 Folder

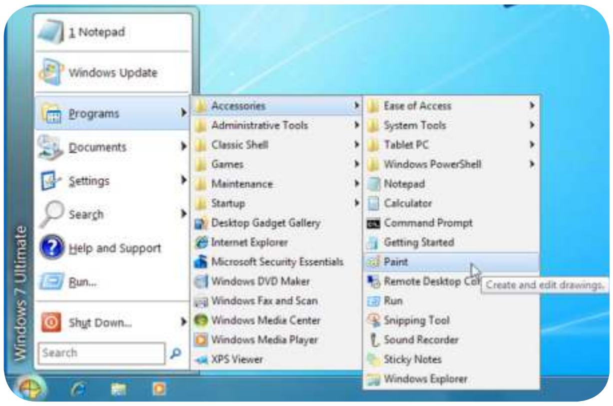
A folder is a storage space that contains multiple files. We can create files as per the user's need. For clear understanding, we can take the example of a bookshelf in a library. The individual book can be considered as a 'file' and the whole set of books in a shelf can be considered as folders. When we right click on the mouse, the pop-up menu appears on the screen with multiple options. Select 'New' option and a secondary menu comes up with another set of options. Select Folder option in the menu. You can now save your file(s) in the newly created folder.

Folder

7.2 Creating Files

More people are using Windows and LINUX operating systems in their computers. We can do many activities like collecting notes, drawing / painting, creating animations / spreadsheets / word docs / PPTs etc.

We use 'Guide Board' to go to unknown places. When we 'On' the computer and click the 'Start' button at the left corner of the computer, it shows the list of all programs in the computer. Now select the required program and create the required files.



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If the computer is operating on the Windows OS, we can collect our notes in 'Notepad' application and draw pictures in 'Paint' application. As per its name we can type notes in 'Notepad' and save the created files in a folder. Likewise in the 'Paint' app we can draw and edit pictures. Let us see how we can create image gallery, animations and graphics easily.

7.3 Visual Communication Divices

Pictures and audio-visuals gives us more understanding than teaching and writing on the black board. Is it right?

Instead of saying a story like 'once upon a time there was a king' we can understand the concept easily by seeing the video. Also it registers firmly in the minds of the students. The device which helps in explaining the concepts easily through pictures is known as 'Visual Communication Device'. For example photos, audio – visuals, drawings, animations all these can be created easily with the help of computer. Cinema is a good example for 'Visual Communication Device'.

7.3.1 Photo Gallery and Photostory

You all must have admired the photos in the albums. To beautify photos and edit the photos, photographers are using a software known as 'Photoshop'. Can we make photo gallery only with the help of photos or is there anything more to do with a bunch of photos? We can make photostory. Yes, with the photos we can make a story.

In our primary classes we have studied photo stories like this. Children learn concepts easily through photo stories than by reading words. This type of photo stories can be converted easily into videos with the help of the software 'Microsoft Photostory'.

Microsoft Photostory

To make videos with the help of this software we have to order the photos first, then we have to select a music and keep it in a file.

Step 1

Open the application of 'Microsoft Photostory'. In that select 'Begin a new story' and click on 'Next'.

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Step 2

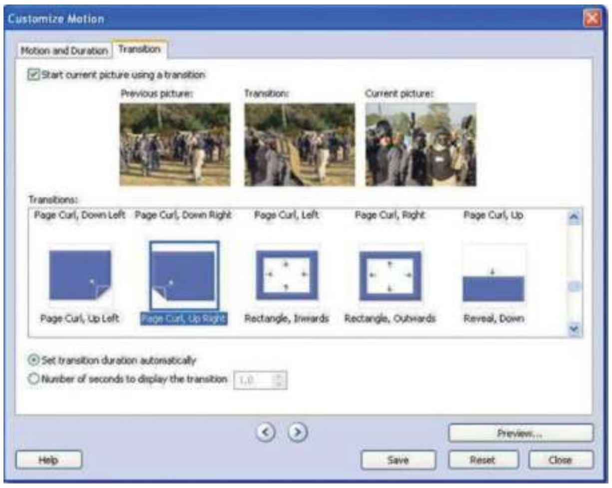
Click **'Import Picture'** in the next screen. Now, the files in our computer will appear. Select 'Saved pictures' for video. There is a provision for editing the picture. If required, we can edit the image and click on 'Next''.

Step 3

Now we can input small text which is apt to the pictures. Then click on 'Next' and give animation to the videos. We can give audio effect also to these images. After finishing this click on 'Next''.

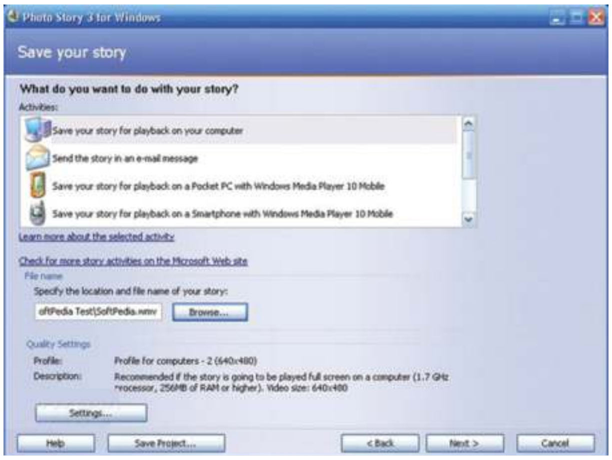
Step 4

To provide background music, we can select a music file through 'Select Music' and click on 'Next'.



Step 5

Next select a title for the story and select the place where it has to be saved in your computer. Then, through 'Settings', change the format of the video.



Step 6

Now our video is ready to view. Click 'View your story'. You can see your video now.

7.3.2 Graphics and Animation

a. Raster Graphics

The picture or image which is created by Raster Graphics is entered 'as file and data'. Pictures are of two types one is Vector another one is Raster.

Raster Graphics are created on the basis of 'Pixels'. The photos taken by camera and the

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photos scanned by a scanner are of the Raster type. When we enlarge this type of photos we could see the pictures as rectangular layers or grids.

Types of Raster Files

- .png (Portable Network Graphics)
- .jpg or .jpeg (Joint Photographics Experts Group)
- .gif (Graphics interchange Format)
- .tiff (Tagged Image File Format)
- .psd (Photoshop Document)

The Software which edit the Raster Graphics is Adobe Photoshop.

b. Vector Graphics

As the Vector Pictures are created on the basis of Mathematics, even when we enlarge the picture its accuracy will not change.

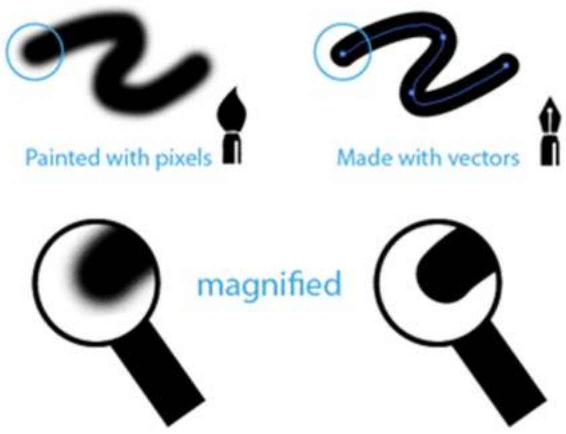
Types of Vector Graphics Files

- .eps (Encapsulated Post Script)
- .ai (Adobe Illustrator Artwork)
- .pdf (Portable Document Format)
- .svg (Scalable Vector Graphics)
- .sketch

The softwares which edit the Vector Graphic Images are:

- Adobe Illustrator
- Sketch
- Inkscape

Creating vector image through Inkscape software



Inkscape software is used to convert image drawn on paper into vector image.

Step 1

First we have to scan the picture we have drawn in the computer.

Step 2

Then we have to open this picture in the 'Inkscape' software. Select the entire picture.

Step 3

Select 'Path' option. From the submenu, select 'Trace Bitmap' option.

Step 4

Do corrections in the small screen which appears. Now upload this edited image and click on OK.

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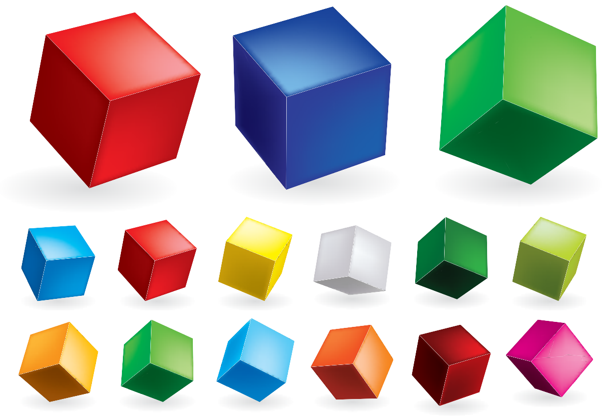
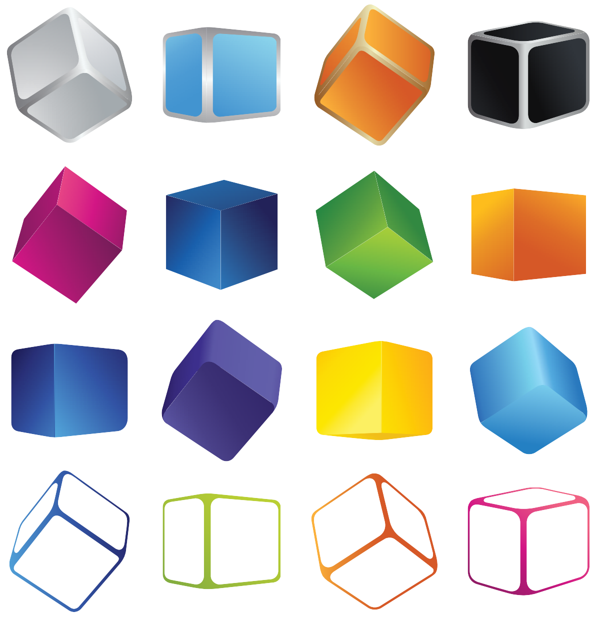
Step 5

Now close the screen of TRACE BITMAP. Now click the picture that appears on the present screen and drag it. You will get the vector graphics of the drawn picture. SAVE it by clicking the 'save button' and save it in your choice of file format.

7.4 Dimensional and 3 Dimensional Images



As soon as we see the above picture we know the difference between the two. The first is TWO DIMENSIONAL (2D) another one is THREE DIMENSIONAL (3D). The two dimensional (2D) images have only the two dimensions - length and height. But three dimensional images (3D) have length, height and width. 3D images appear in front of our eyes like it happens in the real world.



Three dimensional videos will bring the scenes alive before our eyes. Already there are three dimensional films. Now three dimensional games have also got released.

Now there is a new technology - VIRTUAL REALITY in 3D. VIRTUAL REALITY is a technology which shows the computer image as real image. When we see games through this technology we can feel / perceive the setting of the game as real. Now this technology has been introduced in Smart Phones too.

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Evaluation

I. Choose the correct answer.

1. Which of the following is an example for animation?
   a) Sound communication
   b) Visual communication
   c) Vector communication
   d) Raster communication

2. Who uses the photoshop software more ?
   a) Teacher
   b) Doctor
   c) Painter
   d) Photographer

3. Which option is used in the Microsoft Photostory to upload the photos?
   a) Begin a Story
   b) Import Pictures
   c) Settings
   d) View your Story

4. Which technology shows the computer-drawn pictures as real picture?
   a) Inkscape
   b) Photo Story
   c) Virtual Reality
   d) Adobe Illustrator

5. Which technology uses pixels to create pictures?
   a) Vector b) Raster
   c) Both d) None

6. Which software is used to create symbols?
   a) Photoshop
   b) Illustrator
   c) Vector Graphics
   d) Photostory

II. Match the following.

Animations	3D
Raster	Visual Communication
Vector	Pixles
Virtual Reality	Microsoft Photostory
Video Story	Illustrator

III. Answer briefly.

1. What is Raster Graphics?
2. Write a note on 2D and 3D pictures.
3. Differentiate between Raster and Vector images.
4. With the help of Microsoft Photostory how will you create a video?

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A-Z GLOSSARY

Atoms	– அணுக்கள்
Anion	– எதிர்மின் அயனி
Asexual Reproduction	– பாலிலா இனப்பெருக்கம்
Androecium	– மகரந்தத்தாள் வட்டம்
Anemia	– இரத்த சோகை
Antiseptic	– கிருமிநாசினி / நச்சுத்தடை பொருள்
Acceleration	– முடுக்கம்
Aphelion	– சூரியனுக்கு தொலைவில் இருக்கும் பூமியின் நிலை (portion)
Astronomy	– வானியல் பொருட்களைப் பற்றி படிக்கும் இயற்பியல் பிரிவு
Budding	– மொட்டு விடுதல்
Burn	– தீக்காயம்
Bruise	– கன்றிப்போன காயம்
Compound	– இரண்டு அல்லது அதற்கு மேலான, வேறுபட்ட மூலக்கூறுகளிலான சேர்மம்
Chemical formula	– அணுக்கள் மற்றும் மூலக்கூறுகளைக் குறிக்கக்கூடிய குறியீடு
Cation	– நேர்மின் அயனி
Coloumb	– மின்னூட்டத்தின் அலகு
Calyx	– புல்லி வட்டம்
Corolla	– அல்லி வட்டம்
Communicable disease	– தொற்று நோய்கள்
Cross Pollination	– அயல் மகரந்தச் சேர்க்கை
Centre of gravity	– ஈர்ப்பு மையம்
Celestial bodies	– வானியல் பொருள்கள்
Ductile	– கம்பியாக மாற்றக்கூடிய தன்மைவாய்ந்த உலோகம்
Density	– ஓரலகு பருமனில் அடங்கியுள்ள மொத்த பொருளின் நிறை
Distance	– தொலைவு
Displacement	– இடப்பெயர்ச்சி
Derived quantities	– அடிப்படை அளவுகளிலிருந்து தருவிக்கப்பட்ட அளவுகள்
Element	– ஒரே வகை அணுக்களினால் ஆன தனிமம்
Equilibrium	– சமநிலை
Free radical	– முடிவுறா மூலக்கூறு
Fragmentation	– துண்டாதல்
Fertilization	– கருவுறுதல்
First aid	– முதலுதவி

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Gynoecium	–	சூலக வட்டம்
Gingivitis	–	பல்ஈறு வீக்கம்
Ion	–	அயனி
Inter – atomic distance	–	இரு அணுக்களுக்கு இடையே உள்ள தொலைவு
Matter	–	அணு மற்றும் மூலக்கூறுகளினால் ஆன பருப்பொருள்
Malleable	–	தகடாக மாற்றக்கூடிய தன்மைவாய்ந்த உலோகம்
Mass	–	பருப்பொருள்களில் அடங்கியுள்ள பொருளின் அளவு
Melting	–	திடப்பொருள் திரவமாக மாறக்கூடிய நிகழ்வு
Matter	–	பருப்பொருள்
Molecules	–	மூலக்கூறுகள்
Meditation	–	தியானம்
Measuring container	–	அளவுகள் குறிக்கப்பட்ட கொள்கலன்
Non – unifor acceleration	–	சீரற்ற முடுக்கம்
Negative acceleration	–	எதிர் முடுக்கம்
Neptune	–	சூரிய குடும்பத்தில் உள்ள ஒரு கோளின் பெயர்
Orbit	–	ஆற்றல் மட்டம்
Particles	–	சிறிய துகள்கள்
Pollination	–	மகரந்தச் சேர்க்கை
Plaque	–	பல் சொத்தை / பல்தட்டை
Pustules	–	கொப்பளங்கள்
Positive acceleration	–	நேர் முடுக்கம்
Perihelion	–	சூரியனுக்கு அருகில் இருக்கும் பூமியின் நிலை (position)
Physical quantity	–	ஒரு பொருளின் இயற்பியல் பண்புகளின் அளவுகள்
Sexual reproduction	–	பாலினப் பெருக்கம்
Subatomic particles	–	அணுவகத் துகள்கள்
Self Pollination	–	தன் மகரந்தச் சேர்க்கை
Speed	–	வேகம்
System of international unit (SI)	–	பன்னாட்டு அலகு முறை
Tuberculosis	–	காச நோய்
Uniform acceleration	–	சீரான முடுக்கம்
Valency	–	இணைதிறன்
Vegetative propagation	–	உடலவழி இனப்பெருக்கம்
Velocity	–	திசைவேகம்
Vacuum	–	வெற்றிடம் (காற்று இல்லாத இடம்)

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SOCIAL SCIENCE

TERM - I

VOLUME - 3

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HISTORY

Unit -1

Sources of Medieval India

Learning Objectives

To acquaint ourselves with

- Sources of the study of medieval India
- Temples, mosques, tombs, palaces and forts as important sources
- Literary and inscriptional texts
- Accounts of Arab and Turkish travellers

Introduction:

The periods from A.D. (CE) 700 to 1200 and from A.D. (CE) 1200 to 1700 are classified as Early Medieval and Later Medieval periods, respectively, in Indian history. Numerous and varied sources are fortunately available to the historians engaging in the study of Medieval India. Added to the information that can be gleaned from inscriptions, monuments and coins are the accounts left by Arab, Persian and Turkish chroniclers. These accounts are rich in detail and have given first-hand information on the life of kings, though they provide very little information on the life of the common people. The opinions of the courtiers and chroniclers are often one-sided, written in a hyperbolic language, exaggerating the king's achievements. Let us now explore the various sources available for the study of the history of Medieval India.

Do you know the famous words of Khafi Khan, a courtier of Emperor Aurangzeb? He says, 'It is the duty of an historian to be faithful, to have no hope of profit, no fear of injury, to show no partiality on one side, or animosity on the other, to know no difference between friend and stranger, and to write nothing but with sincerity.'

Sources

Sources are the supporting materials, documents or records in the form of evidence that help to reconstruct the past.

Classification of Sources

- Primary Sources
- Secondary Sources

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We examine the details of political, economic and socio-cultural developments with the aid of sources.

Primary Sources: Inscriptions, monuments and coins, and the information available in them.

Secondary Sources: Literary works, chronicles, travelogues, biographies and autobiographies.

Inscriptions

Inscriptions are writings engraved on solid surfaces such as rocks, stones, temple walls and metals. The king's royal decrees, dedications and donations, monuments raised in commemoration of victories in wars, those built in memory of deceased warriors, contain rich information about the concerned era. Copper-plate grants, which were treated as legal documents, have significant source value. The Islamic-Persian practices and the relatively high cost of copper plates made palm leaf and paper cheaper alternatives from 13th century onwards.

Rock Inscription

Several copper-plate grants issued during the later Chola period (10th to 13th century) record gifts to individual priests or teachers who were Hindu, Buddhist, or Jaina, or to persons of eminence. Both the giver and the receiver are elaborately described. By contrast, most stone inscriptions differ in their content.

Copper plate Inscription

In stone inscriptions, the beneficence of a donor is recorded. The major focus is upon the giver. Tiruvalangadu plates of Rajendra Chola I and the Anbil plates of Sundara Chola are notable examples. Uttiramerur inscriptions in Kanchipuram district provide details of the way in which the village administration was conducted.

Various types of lands gifted by the Chola kings are known from the inscriptions and copper plates. They are:

Vellanvagai	land of non-brahmin proprietors
Brahmadeya	land gifted to Brahmins
Shalabhoga	land for the maintenance of a school
Devadana	land gifted to temples
Pallichchandam	land donated to Jaina institutions

Monuments

Temples, palaces, mosques, tombs, forts, minars and minarets are called by the collective name monuments.

Dilwara Temple Mt. Abu

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The Sultans of Delhi introduced a new type of architecture. The monuments they built had arches, domes and minarets as the main features. The inscriptions in these monuments contain rich information, which can be used to construct history. The medieval Khajuraho monuments (Madhya Pradesh) and temples in Konark (Odisha) and Dilwara (Mt.Abu, Rajastan) constitute valuable sources to understand the religion-centered cultural evolution in northern India. Temples in Thanjavur (Brihadeshwara), Gangaikonda Cholapuram and Darasuram symbolise the magnificent structures the Later Cholas built in Tamil Nadu. Vitala and Virupaksha temples at Hampi similarly speak of the contribution of Vijayanagara rulers (15th century).

Hampi - Vijayanagar

Quwwat-ul Islam Masjid, Moth-ki-Masjid, Jama Masjid, Fatehpur Sikri Dargah (all in and around Delhi) and Charminar (Hyderabad) are the important mosques belonging to the medieval times.

Charminar

The forts of historical importance are Agra Fort, Chittor Fort, Gwalior Fort and Delhi Red Fort as well as the forts of Daulatabad (Aurangabad) and Firoz Shah Kotla (Delhi). Palaces in Jaipur, Jaisalmer and Jodhpur signify the greatness of the Rajput dynasty that wielded enormous power from these places. Qutb Minar and Alai-Darwaza, the tombs of Iltutmish, Balban and all the Mughal rulers are the other prominent structures recognised as valuable sources of information. Cities in ruin such as Firozabad and Tughlaqabad in north India and Hampi in south India remain rich repositories of the history of medieval India.

Coins

The portrait and the legend on the coins convey the names of kings with their titles, events, places, dates, dynasties and Royal emblems. The composition of metals in the coins gives us information on the economic condition of the empire. Mention of king's achievements like military conquests, territorial expansion, trade links and religious faith can also be found in the coins.

Muhammad Ghori had stamped the figure of Goddess Lakshmi on his gold coins and had his name inscribed on it. This coin tells us that this early Turkish invader was in all likelihood liberal in religious outlook.

Copper Jitals are available for the study of the period of the Delhi Sultans.

Lakshmi Coin of Ghori

Coins of Khalji

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Silver Tanka introduced by Iltutmish, Ala-ud-din Khalji's gold coins, Muhammad-bin-Tughluq's copper *token currency* are indicative of coinage as well as the economic prosperity or otherwise of the country of the time.

DO YOU KNOW?

A jital contained 3.6 grains of silver. Forty-eight jitals were equal to 1 silver tanka.

Religious Literature

Devotional movement in South India and later in North resulted in the development of bhakti or devotional literature. The Chola period was known as the period of devotional literature and works such as *Kamba Ramayanam*, Sekkizhar's *Periyapuranam*, *Nalayira Divyaprabhandham*, composed by 12 Azhwars and compiled by Nathamuni, *Devaram* composed by Appar, Sambandar and Sundarar and compiled by Nambiyandar Nambi, Manikkavasakar's *Thiruvasagam*, all were scripted during the Chola times. Jayadeva's *Gita Govindam* (12th century) was a follow-up of the Bhakti Movement in South India. Kabir Das, a 15th century mystic poet, also had an influence on the Bhakti Movement in India.

Secular Literature

Madura Vijayam and *Amuktamalyatha* were poems composed by Gangadevi and Krishnadevaraya respectively that help us gain insight into the events and individuals associated with the Vijayanagara Empire. Chand Bardai's *Prithiviraj Raso* portrays the Rajput king's valour. For pre-Islamic periods, the only exception was Kalhana's *Rajtarangini* (11th century).

Books, Biographies and Autobiographies

Minhaj-us-Siraj, patronised by Sultan Nazir-ud-din Mahmud of Slave Dynasty, wrote *Tabakat-i-Nasiri*. The compendium deals with the period from the conquest of Muhammad Ghori to A.D. (CE) 1260. The compendium was named after his patron. In the 13th century, Hasan Nizami, a migrant from Ghazni wrote. *Taj-ul-Ma'asir* towards the end of Iltutmish's rule. It provides information about Qutb-ud-din Aibak and is considered the first official history of the Delhi Sultanate. Zia-ud-din Barani, a courtier of Muhammad Tughluq, wrote *Tarikh-i-Firoz Shahi,* in which he dealt with the history of Delhi Sultanate from Ghiyas-ud-din Balban to the early years of the reign of Firoz Shah Tughluq. Ferishta's *Tarikh-i-Frishta* (16th century) deals with the history of the rise of the Mughal power in India.

Tabakat is an Arabic word meaning 'generations or centuries'.
Tuzk is a Persian word meaning 'autobiography'.
Tarikh or ***Tahquiq*** are Arabic words meaning 'history'.

In the 16th century, emperor Babur's *Babur Nama* and Abul Fazal's *Ain-i-Akbari* and Akbar Nama provided detailed information about these two emperors. In the 17th century, Jahangir wrote his memoir, *Tuzk-i-Jahangiri,* throwing a lot of light on the period. Apart from autobiographies of emperors, *Tabakat-i-Akbari,* authored by Nizam-ud-din Ahmad, is considered reliable than the exaggerated account

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of Abul Fazal. Similarly, Badauni's outstanding work, *Tarikh-i-Badauni* (Badauni's History), was published in 1595. This work spans three volumes. The volume on Akbar's reign is a frank and critical account of Akbar's administration, particularly of his religious policy.

Travellers and Travelogues

Marco Polo, a Venetian traveller, visited when the Pandya kingdom was becoming the leading Tamil power in the 13th century. Marco Polo was twice in Kayal, which was a port city (presently in Thoothukudi district of Tamilnadu). It was full of ships from Arabia and China. Marco Polo tells us that he himself came by a ship from China. According to Marco Polo, thousands of horses were imported into southern India by sea from Arabia and Persia.

Al-Beruni (11th century) accompanied Mahmud of Ghazni in one of his campaigns, and stayed in India for 10 years. The most accurate account of Mahmud's Somnath expedition is that of Alberuni. As learned man and a scholar, he travelled all over India trying to understand India and her people. He learnt Sanskrit and studied the philosophy of India. In his book *Tahquiq-i-Hind,* Alberuni discussed the Indian conditions, systems of knowledge, social norms and religion.

Ibn Battuta (14th century), an Arab-born Morocco scholar, travelled from Morocco right across North Africa to Egypt and then to Central Asia and India. His travelogue *(Rihla [The Travels])* contains rich details about the people and the countries he visited. According to him, Egypt was rich then, because of the whole of the Indian trade with the West passed through it. Ibn Battuta tells us of caste in India and the practice of *sati.* We learn from him that Indian merchants were carrying on a brisk trade in foreign ports and Indian ships in the seas. He describes the city of Delhi a vast and magnificent city. Those were the days when Sultan Muhammad bin Tughluq transferred his capital from Delhi to Devagiri (Daulatabad) in the south, converting this city into a desert.

Ibn Battuta

In the South, Vijayanagar had many foreign visitors who left behind their detailed accounts of the state. An Italian named Nicolo Conti came in 1420. Abdur-Razzaq came from Herat (the court of Great Khan in Central Asia) in 1443. Domingo Paes, a Portuguese traveller, visited the city in 1522. All of them recorded their observations, which are very useful for us today to know the glory of the Vijayanagar Empire.

Summary

- ❖ The period from A.D. (CE) 700 to 1200 and from A.D. (CE) 1200 to 1700 are classified as Early Medieval and Later Medieval periods in Indian history.
- ❖ Sources are classified as primary and secondary sources.

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- Inscriptions on stones, rocks and temple walls and copper-plate grants with royal orders and events in the courts, which have evidentiary value are dealt with.
- Temples, palaces, mosques, tombs, forts, minars and minarets, collectively known as monuments, belonging to early Medieval and Mughal periods, are highlighted.
- The coins of Iltutmish, Ala-ud-din Khalji and copper coins of the later Islamic rulers are discussed.
- Devotional literature belonging to the era of Bhakthi Movement is provided.
- Books, biographies and autobiographies that provide information about the political, social and economic conditions of the medieval times are detailed.
- Travellers' accounts mostly by the visiting Arab and Persian scholars are given in the end.

Glossary

chronicler	a person who writes accounts of important historical events	வரலாற்றுப் பதிவாளர்
animosity	hostility, antagonism	விரோதம், பகைமை
travelogue	a book or illustrated account of the places visited and experiences encountered by a traveller	பயணக்குறிப்புகள்
commemoration	in remembrance of	நினைவாக
elaborately	in detail	விரிவாக
minarets	a tall tower, typically part of a mosque	தூபிகள்
repositories	the places, buildings where materials are stored or kept	களஞ்சியங்கள்
portraits	pictures , images in drawing or painting	உருவப்படங்கள்
compendium	a collection of detailed information about a particular subject , especially in a book	தொகுப்பு
substantiate	to prove with evidence	சான்றுகளுடன் நிரூபித்தல்

Evaluation

I. Choose the correct answer

1. ______________ are the writings engraved on solid surfaces such as rocks, stones, temple walls and metals.

   a) Chronicles b) Travelogues

   c) Coins d) Inscriptions

2. ______________ was the land gifted to temples.

   a) Vellanvagai b) Shalabhoga

   c) Brahmadeya d) Devadana

3. ______________period was known as the period of devotional literature.

   a) Chola b) Pandya

   c) Rajput d) Vijayanagara

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4. __________ provides information about the first Sultan of Delhi.

   a) Ain-i-Akbari b) Taj-ul-Ma'asir

   c) Tuzk-i-Jahangiri d) Tarikh-i-Frishta

5. ______________ , an Arab-born Morocco scholar, travelled from Morocco to India.

   a) Marco Polo b) Al Beruni

   c) Domingo Paes d) Ibn Battuta

II Fill in the Blanks

1. ____________ inscriptions provide details about administration in a Brahmadeya village.
2. ____________ had stamped the figure of Goddess Lakshmi on his gold coins and had his name inscribed on it.
3. 3.6 grains of silver amounted to a ____________.
4. _______________ was patronised by Sultan Nazir-ud-din Mahmud of Slave Dynasty.
5. An Italian traveller ______________ visited Vijayanagar Empire in 1420.

III Match the following

1.	Khajuraho	-	Odisha
2.	Konark	-	Hampi
3.	Dilwara	-	Madhya Pradesh
4.	Virupaksha	-	Rajasthan

IV State true or false

1. Pallichchandam was the land donated to Jaina institution.
2. The composition of metal coins gives us information on the political condition of the empire.
3. The high cost of copper made palm leaf and paper cheaper alternatives for recording royal orders and events in royal courts.
4. Domingo Paes, a Portuguese traveller, visited the Chola Empire in 1522.

V Match the statement with the reason

Tick (√) the appropriate answer.

1) **Assertion(A):** Muhammad Ghori's gold coins carried the figure of Goddess Lakshmi.

Reason(R): The Turkish invader was liberal in his religious outlook.

a) R is the correct explanation of A.

b) R is not the correct explanation of A.

c) A is wrong and R is correct.

d) A and R are wrong.

2) Find out the wrong pair

a)	*Madura Vijayam*	-	Gangadevi
b)	Abul Fazal	-	*Ain-i-Akbari*
c)	Ibn Battuta	-	*Tahquiq-i-Hind*
d)	*Amuktamalyatha*	-	Krishnadevaraya

3) Find out the odd one

a) Inscriptions b) Travelogues

c) Monuments d) Coins

VI Answer the following in one or two sentences

1. Who compiled *Nalayira Divyaprabhandham?*
2. What does the word *Tuzk* mean?
3. Name Jahangir's memoir.
4. Name the two different types of sources for the study of history.
5. List out the important mosques and forts constructed during the medieval times.
6. Mention the important foreign travellers who visited India during the medieval period.

VII Answer the following in detail

1. Describe the different types of coins introduced by the rulers of Delhi Sultanate.

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VIII Answer Grid

1. ______________ was a courtier of Emperor Aurangazeb. Ans:	2. Tiruvalangadu copper plates belong to __________. Ans:
3. ______ was the land for the maintenance of the school. Ans:	4. _______________ compiled Periyapuranam. Ans:
5. ______ is an Arabic word meaning history. Ans:	6. Muhammed bin Tughluq transferred his capital from Delhi to ________ in the south. Ans:

IX HOTs

1. The composition of metals in coins is indicative of the economic prosperity of the empire – Substantiate.

X Student Activity

1. Prepare an album collecting pictures of palaces, tombs, mosques and forts of Medieval India.

XI Life skill

1. Find out from the libraries in your town or village and prepare a report about the primary and secondary sources available there.

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ICT CORNER

Sources of Medieval India

PROCEDURE :

Step 1: Open the Browser and type the given URL (or) Scan the QR Code.

Step 2: Click "India " Option and then select any period (Ex. Medieval)

Step 3: Select any dynasty and then select any Kingdom (Ex. Sultanate)

Step 4: Explore the coins with pictorial descriptions.

Sources of Medieval India URL:

https://www.mintageworld.com/ (or) scan the QR Code

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Unit -2

Emergence of New Kingdoms in North India

Learning Objectives

- To acquire knowledge about the kingdoms of Rajputs and their counterparts in North India
- To assess the contributions of Rajputs and Palas to Indian culture
- To know about the early military expeditions of Arabs and Turks

W25RC

Introduction:

Rajput states formed a collective entity that was called Rajputana. Chittor was prominent and had become the rallying point for all Rajput clans. It was small compared to Malwa and Gujarat. Yet the Rajputs ruled over these states. In commemoration of the victory of Rana of Chittor over Malwa, the *Jaya Stambha,* the tower of victory, was built in Chittor. The Pratiharas and the Palas had established their powerful kingdoms in western India and in eastern India respectively. By the 9th century, the Pratihara dynasty had progressed to such an extent that it called itself the sovereigns of Rajasthan and Kanauj. The decline of Pratihara kingdom led to the rise of Palas in Bengal and Chauhans in north-western India. India's Islamic period might have begun in the immediate context of Arabs' conquest of Sind (A.D. (CE)712) rather than in A.D. (CE)1200. But the resistance shown by the kings of Kanauj, especially of Yasovarman (A.D. (CE)736) and later by the Rajput chiefs and kings who held Kanauj and most of northern India until the middle of the 10th century made it impossible.

Jaya Stambha

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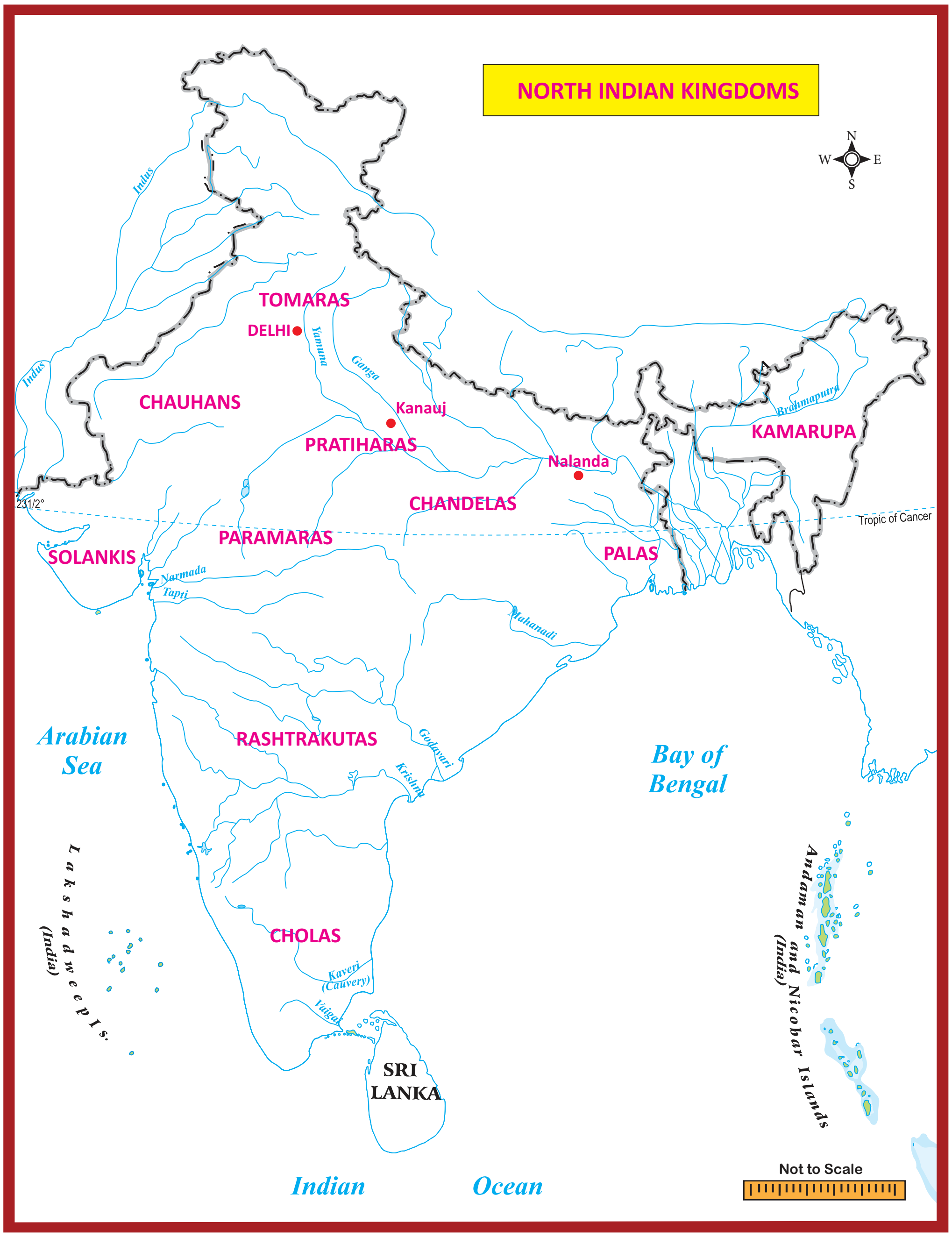
Origin of the Rajputs

The word 'Rajput' is derived from the Sanskrit word Rajputra, which means 'scion of the royal blood'. After the death of Harsha in A.D. (CE) 647, various Rajput clans established kingdoms in different parts of northern and central India. The Rajputs trace their pedigree far back into the past. Their three principal houses are the *Suryavanshi* or the Race of the Sun, the *Chandravanshi* or the Race of the Moon and the *Agnikula* or the Race of Fire God. Among those who claimed descent from solar and lunar lines, Chandelas of Bundelkhand were prominent. Tomaras were ruling in the Haryana region. But they were overthrown by the Chauhans in the 12th century.

Thirty-six royal Rajput clans were listed by the Oriental scholar James Tod in A.D. (CE) 1829. Among them four claimed a special status: the Pratiharas, the Chauhans, the Chalukyas (different from the Deccan Chalukyas), known as Solankis, and the Paramaras of Pawars. All the four clans were of the Agnikula origin.



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Pratiharas

The Pratiharas or Gurjara Pratiharas, one of the four prominent clans of the Rajputs, ruled from Gurjaratra (in Jodhpur). In the 6th century A.D. (CE), Harichandra laid the foundation of the Gurjara dynasty. Nagabhatta I was the first and prominent ruler of Pratiharas. In the 8th century, he ruled over Broach and Jodhpur and extended his dominion upto Gwalior. He repulsed the invasion of the Arabs of Sind from the east and checked their expansion. He was succeeded by Vatsaraja, who desired to dominate the whole of North India. His attempt to control over Kanauj brought him into conflict with the Pala ruler Dharmapala.

> There was a prolonged tripartite struggle between the Gurjara Pratiharas of Malwa, the Rashtrakutas of Deccan and the Palas of Bengal, as each one of them wanted to establish their supremacy over the fertile region of Kanauj. In the process, all the three powers were weakened.

Vatsaraja's successors Nagabhatta-II and Rambhadra did not do anything impressively. Mihirabhoja or Bhoja, son of Rambhadra, within a few years of his accession, succeeded in consolidating the power of the Pratiharas. As a strong ruler, Bhoja was able to maintain peace in his kingdom. The Arab menace was firmly tackled by him. After Bhoja, the Pratihara Empire continued its full glory for nearly a century.

Having successfully resisted the Arabs, the Pratiharas turned their attention towards the east and by the end of millennium, they ruled over a large part of Rajasthan and Malwa. They also held Kanauj for some time. The Rajputs fought each other endlessly in the 11th and 12th centuries. Taking advantage of these internecine quarrels, many local kings succeeded in making themselves independent.

Palas

Dharmapala (A.D. (CE) 770 - 810)

Gopala, who founded the Pala dynasty, did not have royal antecedents. He was elected by the people for his superior capabilities. During his reign from 750 to 770, Gopala laid the foundations for the future greatness of this dynasty in Bengal. Dharmapala, his son, made the Pala kingdom a powerful force in northern Indian politics. He led a successful campaign against Kanauj. He was a great patron of Buddhism. He founded Vikramashila Monastery, which became a great centre of Buddhist learning.

Vikramashila Monastery

Dharmapala was succeeded by his son, Devapala, who extended Pala control eastwards into Kamarupa (Assam). Devapala was also a great patron of Buddhism. He gifted five villages to Buddhists. He also constructed many temples along with monasteries in Magadha. According to the historian R.C. Majumdar, 'The reigns of Dharmapala and Devapala constitute the most brilliant chapter in the history of Bengal.'

After Devapala, five rulers ruled the region insignificantly. The kingdom attained unprecedented glory when Mahipala ascended the throne in 988.

Mahipala I (988 - 1038)

Mahipala I was the most powerful ruler of the Pala dynasty. He is called the founder of the second Pala dynasty. The decline of Pratiharas gave the Palas an opportunity to take a leading role in north Indian affairs. But he could not extend his domain beyond Banaras because of the impressive campaigns of the Chola king from the South, Rajendra Chola. Mahipala restored the old glory of the Palas. He constructed and repaired a large number of religious buildings at Banaras, Sarnath and Nalanda.

The Pala dynasty declined soon after the death of Mahipala and gave way to the Sena dynasty.

The Chauhans

The Chauhans ruled between A.D. (CE) 956 and 1192 over the eastern parts of the present-day Rajasthan, establishing their capital at Sakambari. This Rajput dynasty was founded by Simharaji, who was popularly known as the founder of the city of Ajmer.

The Chauhans were the feudatories of the Pratiharas and staunchly stood by them to check the Arab invasions. The last of Chauhan kings, Prithiviraj Chauhan, was considered the greatest of all Chauhan rulers. He defeated Muhammad Ghori in the first battle of Tarain fought in 1191. However, he was defeated and killed in the second battle of Tarain in 1192.

Contribution of Rajputs to Art and Architecture

Art

Rajput courts were centres of culture where literature, music, dance, paintings, fine arts and sculpture flourished. A specific style of Rajput painting—often focusing on religious themes emerged at Rajput courts. Their style of painting is called 'Rajasthani'. The Rajasthani style of painting can be seen at Bikaner, Jodhpur, Mewar, Jaisalmer (all in Rajasthan).

Rajasthani Painting

Architecture

The Rajputs were great builders. Some of the important examples of the Rajput buildings are the strong fortresses of Chittorgarh. Ranathambhor and Kumbahlgarh

DO YOU KNOW?

There is a long epic poem *Prithvirajraso*, composed by the bard Chand Bardai, a few centuries later. The story goes like this: The daughter of the King of Kanauj was to marry. A *suyamwara* (the bride choosing the bridegroom of her choice) was held to enable her to choose her husband. But she was in love with Prithiviraj and desired to marry him. Prithiviraj was the enemy of her father. In order to insult him, the King of Kanauj had not only denied him an invitation but had placed a statue of Prithiviraj as door keeper at the entrance to his court. To the shock of everyone assembled, the princess rejected the princes present and garlanded the statue of Prithiviraj, indicating her choice. Prithiviraj, who had been hiding in the vicinity, jumped in and rode away with the princess in a horse. Later both of them were married.

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Udaipur Lake Palace

Jaipur Amber Fort

Gwalior Palace

(all in Rajasthan), Mandu, Gwalior, Chanderi and Asirgarh (all in Madhya Pradesh).

The examples of domestic architecture of the Rajputs are the palaces of Mansingh at Gwalior, the buildings at Amber (Jaipur) and lake palaces at Udaipur. Many of the Rajput cities and palaces stand among the hills in forts or by the side of beautiful artificial lakes. The castle of Jodhpur in Rajasthan is perched upon a lofty rock overlooking the town.

The temples the Rajput rulers built have won the admiration of art critics. The temples in Khajuraho, the Sun temple in Konark, the Dhilwara Jain temple constructed in Mount Abu and Khandarya temple at Madhya Pradesh are illustrious examples of their architecture.

The Khajuraho in Bundelkhand has 30 temples. The *shikharas* of the Khajuraho temples are most elegant. The exterior and interior parts of the temples are adorned with very fine sculptures. These temples are dedicated to Jain Tirthankaras and Hindu deities like Shiva and Vishnu.

Kajuraho

The Raksha Bandan *(Rakhi)* tradition is attributed to Rajputs. *Raksha* (protection) Bandhan (to tie or relationship) is a festival that celebrates brotherhood and love. It is believed that if a woman ties a *rakhi* around the wrists of male members, it means they are treating them like brothers. Such men are placed under an obligation to protect them.

Rabindranath Tagore started a mass *Raksha Bandhan* festival during the Partition of Bengal (1905), in which he encouraged Hindu and Muslim women to tie a *rakhi* on men from the other community and make them their brothers. The exercise was designed to counter British efforts to create a divide between Hindus and Muslims.

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There are sixteen Hindu and Jain temples at Osian, which is 32 miles away from Jodhpur. The Jain temple at Mount Abu has a white marble hall and a central dome of 11 concentric rings and richly carved vaulted ceiling and pillars.

Temple at Osian

Contribution of Palas to Culture

The Palas were adherents to the Mahayana school of Buddhism. They were generous patrons of Buddhist temples and the famous universities of Nalanda and Vikramashila. It was through their missionaries that Buddhism was established in Tibet. The celebrated Buddhist monk, Atisha (981-1054), who reformed Tibetan Buddhism, was the president of the Vikramashila monastery. The Palas also maintained cordial relations with the Hindu-Buddhist state of the Shailendras of Sumatra and Java.

Under Pala patronage, a distinctive school of art arose, called Pala art or **Eastern Indian art.** Pala artistic style flourished in present-day states of Bihar and West Bengal, and also in present-day Bangladesh. It was chiefly represented by bronze sculptures and palm-leaf paintings, celebrating the Buddha and other divinities. The Pala bronze sculptures from this area played an important part in the spread of Indian culture in Southeast Asia.

Palm Leaf Painting of Palas

Advent of Islam

Islam as a religious faith originated at Mecca in Arabia. The founder of Islam was Prophet Muhammad. The followers of Islam are called Muslims. An Islamic state, especially the one ruled by a single religious and political leader, was known as 'Caliphate'. Caliph means a representative of the Prophet Muhammad. Two early Caliphates were 'Umayyads' and the 'Abbasids'. Both the Umayyads and the Abbasids expanded their rule separately by their conquests and by preaching the principles of Islam.

In the 8th century India, the Arab presence appeared in the form of a Muslim army that conquered the Sind. But their further expansion was made impossible by the kings of Gangetic plains and the Deccan. By the end of the 9th century, with the decline of the Abbasid Caliphate, the Arab garrisons in India and elsewhere threw off Caliph's control and began to rule independently.

The Turkish governor, Alp-Tegin, was one among them whose capital was Ghazni (Afghanistan). His successor and son-in-law Sabuktigin wanted to conquer India from the north-west. But only his son Mahmud succeeded in this endeavour.

Mahmud of Ghazni (A.D. (CE) 997 -1030)

Mahmud is said to have conducted 17 raids into India. At that time, North India was divided into number of small kingdoms. One of them was

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Arab Conquest of Sind and its Impact

In A.D. (CE) 712, Muhammad bin Qasim who was the commander of the Umayyad kingdom invaded Sind. Qasim defeated Dahir, the ruler of Sind, and killed him in the battle. The capital of Sind, Aror, was captured. Qasim extended his conquest further into Multan. He organised the administration of Sind. The people of Sind were given the status of 'protected subjects'. There was no interference in the lives and religions of the people. But soon Qasim was recalled by the Caliph.

The Arab scholars visited Sind and studied many Indian literary works. They translated many Sanskrit books on astronomy, philosophy, mathematics and medicine into Arabic. They learnt the numerals 0 to 9 from India. Until then, the people in the West did not know the use of zero. Through the Arabs, Europe gained more knowledge in mathematics. The importance of zero was learnt by them from India. It is believed that the people in the West and the Arabs learnt the game of chess only from the Indians.

Arrival of Turks in India

Shahi kingdom, which extended from Punjab to Kabul. The other important kingdoms were Kanauj, Gujarat, Kashmir, Nepal, Malwa and Bundelkhand. The initial raids were against the Shahi kingdom in which its king Jayapala was defeated in 1001. After his defeat, Jayapala immolated himself because he thought that this defeat was a disgrace. His successor Anandapala fought against Mahmud but was defeated in the battle of Waihind, near Peshawar, in 1008. As a result of his victory at Waihind, Mahmud extended his rule over Punjab.

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The subsequent raids of Mahmud into India were aimed at plundering the rich temples and cities of North India. In 1011 he raided Nagarkot in Punjab hills and Thaneshwar near Delhi.

Ruins of Somnath Temple

In 1018 Mahmud plundered the holy city of Mathura. He also attacked Kanauj. The ruler of Kanauj, Rajyapala, abandoned Kanauj and later died. Mahmud returned with enormous riches. His next important raid took place in Gujarat. In 1024 A.D. (CE) Mahmud marched from Multan across Rajaputana and defeated the Solanki king Bhimadeva I and plundered Anhilwad. Mahmud is said to have sacked the famous temple of Somanath, breaking the idol. Then he returned through the Sind desert. That was his last campaign in India. Mahmud died in 1030 A.D. (CE) The Ghaznavid Empire roughly included Persia, Trans-Oxyana, Afghanistan and Punjab.

Muhammad of Ghor (1149 - 1206)

Muhammad of Ghor or Muhammad Ghori started as a vassal of Ghazni but became independent after the death of Mahmud. Taking advantage of the decline of the Ghaznavid Empire, Muhammad Ghori brought Ghazni under his control. Having made his position strong and secure at Ghazni, Muhammad turned his attention to India. Unlike Mahmud of Ghazni, he wanted to extend his empire by conquering India. In 1175 Muhammad captured Multan and occupied whole of it in his subsequent expeditions. In 1186 he attacked Punjab and captured it.

The Battle of Tarain (1191 - 1192)

Realising the grave situation in which they were caught, the Hindu princes of North India formed a confederacy under the command of Prithiviraj Chauhan. Prithiviraj rose to the occasion and defeated Muhammad in the battle of Tarain near Delhi in 1191. This was called the first battle of Tarain. To avenge this defeat, Muhammad made serious preparations and gathered a huge army. He arrived with his large force in Lahore via Peshawar and Multan. He sent a message to Prithiviraj, asking him to acknowledge his supremacy and become a Muslim. But Prithiviraj rejected the proposal and prepared his army to resist the invader. Many Hindu kings and chieftains also joined him. In the ensuing second battle of Tarain in 1192, Muhammad thoroughly routed the army of Prithiviraj who was defeated and killed.

The second battle of Tarain was a major disaster for the Rajputs. Their political prestige suffered a serious setback. The whole Chauhan kingdom now lay at the feet of the invader. The first Muslim kingdom was thus firmly established in India at Ajmer and a new era in the history of India began. After his victory over Prithiviraj at Tarain, Muhammad returned to Ghazni to deal with the threat from the Turks and the Mongols. After the death of Muhammad in 1206, his most capable general Qutb-ud-din Aibak who had been left behind in India took control of Muhammad's territories in India and declared himself as the First Sultan of Delhi.

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Summary

- ❖ After Harsha, new regional powers emerged. Prominent ruling dynasties among them were Pratiharas, Palas, Chauhans and Paramaras.
- ❖ Pratiharas and Palas were battling to control the northern plains. Their focus was on capturing the city of Kanauj.
- ❖ The continued conflict over the possession of Kanauj prompted the local chieftains and kings to declare themselves independent.
- ❖ The Rajputs and Palas made impressive contribution to the evolving Indian culture.
- ❖ The attempts of Arabs to expand were resisted by various rulers.
- ❖ Military raids of Mahmud of Ghazni in the 11th century followed by expeditions of Muhammad of Ghor paved the way for the establishment of Islamic rule in India.

Glossary

scion	a descendant of the notable family	வாரிசு, வழித்தோன்றல்
unprecedented	exceptional	முன்னெப்போதுமில்லாத
internecine	mutually destructive	இருசாராருக்கும் நாசத்தை விளைவிக்கின்ற
portraiture	the art of painting	சித்தரிக்கும் கலை
elegant	grand	நேர்த்தியான
monastery	a place where monks live	மடாலயம்
confederacy	a league or alliance of states	கூட்டமைப்பு

Evaluation

I. Choose the correct answer

1. Who wrote *Prithivirajraso?*

   a) Kalhana
   b) Vishakadatta
   c) Rajasekara
   d) Chand Bardai

2. Who was the first prominent ruler of Pratiharas?

   a) Bhoja I   b) Naga Bhatta I
   c) Jayapala   d) Chandradeva

3. Ghazni was a small principality in ________

   a) Mangolia   b) Turkey
   c) Persia   d) Afghanistan

4. What was the most important cause of the invasion of Mahmud of Ghazni?

   a) To destroy idolatry
   b) To plunder the wealth of India
   c) To spread Islam in India
   d) To establish a Muslim state in India

II Fill in the blanks

1. ____________ was the founder of Vikramashila University.
2. Arabs conquered Sind in ____________.
3. The city of Ajmeer was founded by ____________.
4. The Khandarya temple is in ____________________.

III Match the following

1. Khajuraho - Mount Abu
2. Sun temple - Bundelkhand
3. Dilwara Temple - Konark

IV True or False

1. Rajputra is a Latin word.
2. King Gopala was elected by the people.
3. The temple at Mount Abu is dedicated to Lord Shiva.
4. Raksha Bandan is a festival of brotherhood.
5. Indians learnt the numerals 0 – 9 from Arabs.

V Consider the following statements. Tick (√) the appropriate answer.

1. **Assertion:-** The tripartite struggle was to have control over Kanauj.

   Reason:-Kanauj was a big city.

   a) R is the correct explanation of A.

   b) R is not the correct explanation of A.

   c) A is wrong and R is correct.

   d) A and R are wrong.

2. **Statement I.** Mahipala could not extend his domain beyond Benaras.

   Statement II. Mahipala and Rajendra Chola were contemporaries.

   a) I is correct.

   b) II is correct.

   c) I and II are correct.

   d) I and II are false.

3. **Assertion:-** India's Islamic period did not begin after Arab conquest of Sind in AD (CE)712.

   Reason:- Gurjara Pratiharas gave a stiff resistance to Arabs.

   a) R is the correct explanation of A.

   b) R is not the correct explanation of A.

   c) A is correct and R is wrong.

   d) A is wrong and R is correct.

4. **Assertion:-** The second battle of Tarain was lost by Prithiviraj.

   Reason:-There was disunity among the Rajputs

   a) R is the correct explanation of A.

   b) R is not the correct explanation of A.

   c) A is correct and R is wrong.

   d) A is wrong and R is correct.

5. **Consider the following statements and find out which is/are correct.**

   1. *Raksha Bandan* tradition is attributed to Rajputs.

   2. Tagore started a mass *Raksha Bandan* festival during Partition of Bengal

   3. *Raksha Bandan* was to counter the British attempt to create a divide between Hindus and Muslims.

   a) 1 is correct.

   b) 2 is correct.

   c) 3 is correct.

   d) All the above are correct.

VI Answer in one or two sentences

1. Write about tripartite struggle over Kanauj.
2. Name any four Rajput clans.
3. Who was the founder of Pala dynasty?
4. Mention the first two early Caliphates.
5. Name the ruler of Sind who was defeated by Qasim.

VII Answer the following in detail

1. What was the impact of Arab conquest of Sind? (point out any five)

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VIII HOTs

a. Difference between Mahmud Ghazni's invasion and Muhammad Ghor's invasion.

b. Find out

	First battle of Tarain	Second battle of Tarain
Fought in the year		
Causes for the battle		
Who defeated whom?		
What was the result?		

IX Students activity

a) Word Splash

(Students discuss what they know about the words given here. They use the words from what they have learnt in a narrative form)

Harsha	Rajputs
Kanauj	Vikramashila
Prithiviraj	Caliph

b) Time Line

Write the event for the given year in each column.

Advent of Islam in India

- A.D.(C.E) 1192
- A.D. (C.E)1191
- A.D. (C.E) 1175
- A.D. (C.E) 1030
- A.D. (C.E)1001
- A.D. (C.E)712

X Map work

On the river map of India mark the territories ruled by Pratiharas, Chauhans, Palas and Paramaras.

XI Answer Grid

1. Who was the Shahi ruler of Punjab defeated by Mahmud of Ghazni? Ans:	2. Rajput style of Painting is called __________ Ans:
3. How many Rajput clans were there? Ans:	4. Who established the first Islamic empire in India? Ans:
5. Who was the first Sultan of Delhi? Ans:	6. Where is Mecca? Ans:

XII Life skill

1. Make an album with the pictures of temples built by Rajput rulers.

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Unit -3

Emergence of New Kingdoms in South India: Later Cholas and Pandyas

Learning Objectives

- ❖ To trace the origin of the later Cholas and the later Pandyas
- ❖ To know about the prominent rulers of both the kingdoms
- ❖ To acquaint with their administrative system
- ❖ To understand the social, economic and cultural development during their reign

I. The Later Cholas

Introduction

The Cholas are one among the popular and well-known Tamil monarchs in the history of South India. The elaborate state structure, the extensive irrigation network, the vast number of temples they built, their great contributions to art and architecture and their overseas exploits have given them a pre-eminent position in history.

Revival of the Chola Rule

The ancient Chola kingdom reigned supreme with the Kaveri delta forming the core area of its rule and with Uraiyur *(present-day Tiruchirappalli)* as its capital. It rose to prominence during the reign of Karikala but gradually declined under his successors. In the 9th century Vijayalaya, ruling over a small territory lying north of the Kaveri, revived the Chola Dynasty. He conquered Thanjavur and made it his capital. Later Rajendra I and his successors ruled the empire from Gangaikonda Cholapuram, the newly built capital.

Rajaraja I (A.D. (CE) 985 - 1014) was the most powerful ruler of Chola empire and also grew popular beyond his times. He established Chola authority over large parts of South India. His much-acclaimed naval expeditions led to the expansion of Cholas into the West Coast and Sri Lanka. He built the famous Rajarajeswaram (Brihadeshwara) Temple in Thanjavur. His son and successor, Rajendra Chola I (A.D. (CE) 1014 - 1044, matched his father in his ability to expand the empire. The Chola empire remained a powerful force in South India during his reign.

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After his accession, his striking military expedition was to northern India, capturing much territory there. He proclaimed himself the Gangaikondan (conqueror of the Gangai region). The Gangaikonda Cholapuram temple was built to commemorate his victories in North India. The navy of Rajendra Chola enabled him to conquer the kingdom of Srivijaya (southern Sumatra). Cholas' control over the seas facilitated a flourishing overseas trade.

Decline of the Chola Empire

Rajendra Chola's three successors were not capable rulers. The third successor Veerarajendra's son Athirajendra was killed in civil unrest. With his death ended the Vijayalaya line of Chola rule.

Ruins of Gangaikonda Cholapuram

Matrimonial alliances between the Cholas and the Eastern Chalukyas began during the reign of Rajaraja I. His daughter Kundavai was married to Chalukya prince Vimaladitya. Their son was Rajaraja Narendra who married the daughter of Rajendra Chola named Ammangadevi. Their son was Kulothunga I.

On hearing the death of Athirajendra, the Eastern Chalukya prince Rajendra Chalukya seized the Chola throne and began the rule of Chalukya-Chola dynasty as Kulothunga I. Kulothunga established himself firmly on the Chola throne soon eliminating all the threats to the Chola Empire. He avoided unnecessary wars and earned the goodwill of his subjects. But Kulothunga lost the territories in Ceylon. The Pandya territory also began to slip out of Chola control. Kanchipuram was lost to the Telugu Cholas. The year 1279 marks the end of Chola dynasty when King Maravarman Kulasekara Pandyan I defeated the last king Rajendra Chola III and established the rule of the Pandyas in present-day Tamil Nadu.

Administration

The central administration was in the hands of king. As the head of the state, the king enjoyed enormous powers. The king's orders were written down in palm leaves by his officials or inscribed on the temple walls. The kingship was hereditary in nature. The ruler selected his eldest son as the heir apparent. He was known as Yuvaraja. The Yuvarajas were appointed as Governors in the provinces mainly for administrative training.

The Chola rulers established a well-organised system of administration. The empire, for administrative convenience, was divided into provinces or *mandalams*. Each mandalam was sub-divided into *naadus*. Within each naadu, there were many *kurrams* (groups of villages). The lowest unit was the *gramam* (village).

Local Governance

Local administration worked through various bodies such as Urar, Sabhaiyar, Nagarattar and Nattar. With the expansion of agriculture, numerous peasant settlements came up on the countryside. They were known as Ur. The Urar, who were landholders acted as

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spokesmen in the Ur. Sabhaiyar in Brahman villages also functioned in carrying out administrative, financial and judicial functions. Nagarattar administered the settlement of traders. However, skilled artisans like masons, blacksmiths, goldsmiths, weavers and potters also lived in Nagaram. Nattar functioned as an assembly of Nadu and decided all the disputes and issues pertaining to Nadu.

The assemblies in Ur, Sabha, Nagaram and Nadu worked through various committees. The committees took care of irrigation, roads, temples, gardens, collection of revenue and conduct of religious festivals.

Uttiramerur Inscriptions

Uttiramerur Inscriptions

Uttiramerur presently in Kanchipuram district was a Brahmadeya village (land grants given to Brahmins). There is a detailed description of how members were elected to the committees of the village sabha in the inscriptions found there. One member was to be elected from each ward. There were 30 wards in total. The eligibility to contest was to men in the age group of 35–70, well-versed in vedic texts and scriptures, and also owned land and house. The process of election was as follows: The names of qualified candidates from each ward were written on the palm-leaf slips and put into a pot. The eldest of the assembly would engage a boy to pull out one slip and declare his name. Various committees were decided in this way.

Revenue

The revenue of the Chola state came mainly from the land. The land tax was known as Kanikadan. The Chola rulers carried out an elaborate survey of land in order to fix the government's share of the land revenue. One-third of produce was collected as land tax. It was collected mostly in kind. In addition to land tax, there were taxes on profession and tolls on trade.

Social Structure Based on Land Relations

The Chola rulers gifted tax-free lands to royal officials, Brahmins, temples (devadana villages) and religious institutions. Land granted to Jain institutions was called *pallichchandam*. There were also of *vellanvagai* land and the holders of this land were called Vellalars. *Ulu-kudi*, a sub-section of Vellalar, could not own land but had to cultivate *Brahmadeya* and *vellanvagai* lands. The holders of *vellanvagai* land retained *melvaram* (major share in harvest). The ulu-kudi got *kil-varam* (lower share). *Adimai* (slaves) and *panicey-makkal* (labourers) occupied the lowest rung of society. In the intermediate section came the armed men and traders.

Irrigation

Cholas gave importance to irrigation. The 16-mile long embankment built by Rajendra Chola in Gangaikonda Cholapuram is an illustrious example. *Vati-vaykkal,* a criss-cross

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channel, is a traditional type of harnessing rain water in the Cauvery delta. *Vati* is a drainage channel and a *vaykkal* is the supply channel. The commonly owned village channel was called *ur-vaykkal*. The nadu level vaykkal is referred to as *nadu-vaykkal*. The turn-system was in practice in distributing the water.

Religion

Chola rulers were ardent Saivites. Hymns, in praise of the deeds of Lord Siva, were composed by the Saiva saints, the Nayanmars. NambiyandarNambi codified them, which came to be known as the *Thirumurai*.

Temples

The Chola period witnessed an extensive construction of temples. The temples in Thanjavur, Gangaikonda Cholapuram and Darasuram are the repository of architecture, sculpture, paintings and iconography of the Chola art. Temples during the Chola period were not merely places of worship. They were the largest landholders. Temples promoted education, and devotional forms of art such as dance, music and drama. The staff of the temples included temple officials, dancing girls, musicians, singers, players of musical instruments and the priests.

Cholas as Patrons of Learning

Chola kings were great patrons of learning. Rajendra I established a Vedic college at Ennayiram (now in Villupuram District). There were 340 students learning the Vedas, grammar and Upanishads under 14 teachers. This example was later followed by his successors and as a result two more such colleges had been founded, at Tirubuvanai near present-day Puducherry and Tirumukkoodal in present-day Chengalpattu district, in 1048 and 1067 respectively. The great literary works *Periyapuranam and Kamba Ramayanam* belong to this period.

Trade

There was a flourishing trade during the Chola period. Trade was carried out by two guild-like groups: *anju-vannattar* and *mani-gramattar*. *Anju-vannattar* comprised West Asians, Arabs, Jews, Christians and Muslims. They were maritime traders and settled on the port towns all along the West Coast. It is said that *mani-gramattar* were the traders engaged in inland trade. In due course, both groups merged under the banner of *ai-nutruvar* and *disai-ayirattu-ai-nutruvar* functioning through the head guild in Ayyavole, Karnataka. This ai-nutruvar guild operated the maritime trade covering South-East Asian countries.

Big Temple Thanjavur

Gangaikonda Cholapuram Temple

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Through overseas trade with South-East Asian countries elephant tusks, coral, conch transparent glass, betel nuts, cardamom, opaque glass, cotton stuff with coloured silk threads were imported. The items exported from here were sandalwood, ebony, condiments, precious gems, pepper, oil, paddy, grains and salt.

II. The Later Pandyas

Introduction

Pandyas were one of the three ancient Tamil dynasties that ruled southern India since the 4th century B.C. (BCE) but intermittently. Korkai, associated with pearl fisheries, is believed to have been their early capital and port. They moved to Madurai later, as many early Tamil inscriptions of Pandyas have been unearthed in Madurai and its surroundings. Under the Pandya kings of the Sangam Age, Madurai was a great centre of culture. Poets and writers of Tamil language gathered there and contributed to the development of Tamil Classics. The Pandyas had re-established their strong position in south Tamil Nadu by the end of the 6th century A.D. (CE), after eliminating the rule of Kalabhras. But they could not resist the rising power of the later Cholas who ruled South India from 9th to 13th century. Thereafter taking advantage of the decline of Chola power, the later Pandyas re-established their authority. Their rule continued until 16th century.

Revival of Pandya Kingdom (A.D. (CE) 600 - 920)

Kadunkon recovered Pandya territory from the Kalabhras towards the close of 6th century. He was succeeded by two others. Arikesari Maravarman was the first strong Pandya ruler who ascended the throne in A.D. (CE) 642. He was a contemporary of Mahendravarman I and Narsimahvarman I. Inscriptions and copper plates praise his victory over his counterparts: Cheras, Cholas, Pallavas and Sinhalese. Arikesari Maravarman is identified with the Kun Pandian, the persecutor of Jains.

> Saivite saint Thirugnanasambandar converted Arikesari from Jainism to Saivism. On his conversion, Arikesari is alleged to have impaled Jains on stakes. The anti-Jain attitude of Arikesari after his conversion to Saivism cannot be doubted.

After Arikesari, the greatest of the dynasty was Jatila Parantaka Nedunjadayan (Varaguna I) (756-815), the donor of the Velvikkudi plates. Nedunjadayan expanded the Pandya territory to include Thanjavur, Tiruchirappalli, Salem and Coimbatore districts. Nedunjadayan's successors Srimara Srivallabha and Varaguna II, were successively defeated by Pallavas. Later they could not face the rising Chola dynasty under Parantaka I. Parantaka I defeated the Pandya king Rajasimha II who fled the country in 920. Thus ended the Pandya rule revived by Kadungon.

Rise of Later Pandyas (1190 - 1310)

The Chola viceroyalty became weak in Pandya country after the death of Adhirajendra (the last king of Vijayalaya line). Eventually the Pandya kingdom could emerge as the only leading Tamil dynasty in the 13th century. Madurai continued to be their capital. Now Kayal was their great port. Marco Polo, a famous traveller from Venice, visited Kayal twice, in 1288 and 1293. He tells us that this port town was full of ships from Arabia and China and bustling with business activities.

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Marco Polo hailed the Pandyan Kingdom as 'the richest and the most splendid province in the world'. Together with Ceylon, he added, it 'produced most of the gems and pearls that are found in the world'. In his travel account he recorded the incidents of *sati* and the polygamy practiced by the kings.

Sadaiyavarman Sundarapandyan

The illustrious ruler of the second Pandya Kingdom was Sadaiyavarman (Jatavarman) Sundarapandyan (1251 to 1268). He brought the entire Tamil Nadu under his rule, which extended up to Nellore in Andhra. He held the Hoysalas in check. The Chera ruler, the chief of *Malanadu,* accepted his feudatory position and paid tribute to Sundarapandyan. Emboldened by the decline of the Chola state, the Boja King of Malwa region Vira Someswara challenged Sundarapandyan. In a war at Kannanur, Sundarapandyan defeated Someswara. Sundarapandyan succeeded in establishing his authority over the chieftains of Cuddalore, Kanchipuram in northern Tamil Nadu, Arcot and Salem in the western region.

Coin of Pandya Kingdom

There were two or three co-regents who ruled simultaneously along with Sundarapandyan: VikramaPandyan and ViraPandyan. After Sundarapandyan, MaravarmanKulasekaran ruled successfully for a period of 40 years , giving the country peace and prosperity. He had two sons. The king's appointment of ViraPandyan as a co-regent provoked the other son Sundara Pandyan who killed his father Maravarman Kulasekaran. In the civil war that ensued, ViraPandyan won and became firmly established in his kingdom. The defeated SundaraPandyan fled to Delhi and took refuge under the protection of Ala-ud-din Khalji. This provided the opening for the invasion of Malik Kafur.

After Malik Kafur's invasion, the Pandyan Kingdom came to be divided among a number of kings from the main ruling Pandya's family. In Madurai, a Muslim State subordinate to the Delhi Sultan came to be established.

Polity and Society

State

Pandya kings preferred Madurai as their capital. Madurai has been popularly venerated as *Koodal*. The kings are traditionally revered as *Koodal-kon*, *Koodal Nagar Kavalan*. The Pandyas derived military advantage over their neighbours by means of their horses. They imported these horses through Arabs with whom they had commercial and cultural contact.

The king claimed that he was ruling according to Manu Sastra. This doctrine supported the social hierarchy in the society. Kings and local chiefs created Brahmin settlements called *Mangalam* or *Chatur-vedi-mangalam* with irrigation facilities.

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The actual landowning groups are described as the *Bumiputtirar*, otherwise called the *vellalar*. Historically they were locals and hence they were referred to as *nattu-makkal*. The communal assembly of this group is *Cittira Meli Periyanattar*.

Royal Officials

A band of officials executed the royal orders. The prime minister was uttara-mantri. The historical personalities like Manickavasagar, Kulaciraiyar and Marankari worked as ministers. The royal secretariat was known as *eluttu-mandapam*. The most respected officials were *maran-eyinan*, *sattan-ganapathy*, *enathi-sattan*, *tira-tiran*, *murthi-eyinan* and others. The titles of military commanders were *palli-velan, parantakan-palli-velan, maran-adittan* and *tennavan-tamilvel*.

Administrative Divisions

Pandy nadu, as in Chola state, consisted of many provinces known as *vala-nadus*, which, in turn, were divided into many *nadus* and *kurrams*. The administrative authorities of nadus were the nattars. Nadu and Kurram contained settlements, viz. *mangalam*, *nagaram*, *ur* and *kudi,* where different social groups inhabited.

Village Administration

An inscription from Manur (Tirunelveli district) dated A.D. (CE) 800 provides an account of village administration. It looks similar to Chola's local governance that included village assemblies and committees. Both civil and military powers seem to have been vested in the same person.

Irrigation

The Pandya rulers created a number of irrigation sources. On either side of the rivers *Vaigai* and Tamiraparani, channels leading to the irrigation tanks were built. In southern Tamilnadu, like the Cholas, Pandyas introduced the new irrigation technology. Irrigation works were done by local administrative bodies, local chiefs and officials. Repairs were mostly undertaken by local bodies. Sometimes, traders also dug out tanks for irrigation.

Religion

Pandyas extended patronage to vedic practices. Velvikkudi copper plates as well as inscriptional sources mention the rituals like Asvameda yaga, Hiranya garbha and Vajapeya yaga, conducted by every great Pandya king. The impartiality of rulers towards both Saivism and Vaishnavism is also made known in the invocatory portions of the inscriptions. Temples of both sects were patronised through land grant, tax-exemption and renovation.

The great Saiva and Vaishnava saints (Nayanmaras and Alwars) combined contributed to the growth of Tamil literature and spiritual enlightenment. The period was marked by intense religious conflict. The Bhakti movement of the time prompted the heterodox scholars for a debate. Many instances of the defeat of Buddhists and Jains in such debates are mentioned in Bhakti literature. The Pandya kings of the period supported and promoted Tamil and Sanskrit.

Temples

Medieval Pandyas and later Pandyas did not build any new temples but maintained the existing temples, enlarging them with the addition of *gopuras*, and *mandapas*. The monolithic mega size ornamented pillars are the unique feature of the medieval Pandya style. The sculptures of Siva, Vishnu, Kotravai, Ganesa

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and Subramanyar are the best specimens in these temples. Pandyas specially patronised the historic Meenakshi temple at Madurai and kept expanding its premises by adding gopuras and mandapas.

Meenakshi Temple, Madurai

Trade

Arab settlements on the west coast of southern India, from 7th century, had led to the expansion of their trade connection to the east coast because the governments of the east coast pursued a more liberal and enlightened policy towards overseas traders. Their charters exempted traders from various types of port dues and tolls. In Kayal, there was an agency established by an Arab chieftain by name Malik-ul-Islam Jamal-ud-din. This agency facilitated availability of horses to Pandya kings.

In 13th and 14th centuries, horse trade became brisk. Marco Polo and Wassaff state that the kings invested in horses as there was a need of horse for ceremonial purposes as well as for fighting wars. Those who were trading in horses were called *kudirai chetties*. They were active in maritime trade also. The busiest port town under the Pandyas was *Kayal Pattinam* (now in Thoothukudi district) on the east coast. Gold coins were in circulation as the trade was carried through the medium of gold. It was variously called *kasu*, *kalanchu* and *pon*.

The vast trade in horses of that time has been recorded by Wassaff. He writes: '…as many as 10,000 horses were imported into Kayal and other ports of India of which 1,400 were to be of Jamal-ud-din's own breed. The average cost of each horse was 220 dinars of 'red gold'.

Summary

- The Cholas and Pandyas are well known Tamil monarchs.
- Vijayalaya revived the Chola dynasty.
- The prominent Chola rulers are Rajaraja I and Rajendra I.
- Uttiramerur inscriptions provide details of village administration.
- Kodunkon recovered Pandya territory from Kalabhras. Arikesari Maravavarman and Parantaka Nedunjadayan were his two prominent successors.
- The illustrious rulers of later Pandya kingdom were Sadaayavarman Sundarapandyan and Maravarman Kulasekaran.
- Maritime trade during Pandyas is highlighted by Marco Polo and Wassaff.

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Glossary

Matrimonial alliances	political alliances through marriages	திருமண உறவுகள் மூலம் அரசியல் கூட்டு
Embankment	a wall or stone structure built to prevent a river flooding an area as well as to store its water	தடுப்பணை
Ardent	passionate	தீவிரமான
Feudatory	a subordinate to another sovereign/ruler	அரசருக்குக் கட்டுப்பட்ட குறுநில மன்னர்
Refuge	shelter	புகலிடம்
Repository	place in which things are stored	கருவூலம்

Evaluation

I. Choose the Correct answer

1. Who revived the later Chola dynasty?

   a) Vijayalaya
   b) Rajaraja I
   c) Rajendra I
   d) Athirajendra

2. Who among the following Pandya rulers is known for ending the Kalabhra rule?

   a) Kadunkon b) ViraPandyan
   c) Kun Pandyan d) Varaguna

3. Which of the following was the lowest unit of Chola administration?

   a) Mandalam b) Nadu
   c) Kurram d) Ur

4. Who was the last ruler Vijayalaya line of Chola dyanasty?

   a) VeeraRajendra b) Rajadhiraja
   c) AthiRajendra d) Rajaraja II

5. An example of Chola architecture can be seen at____________.

   a) Kannayiram b) Uraiyur
   c) Kanchipuram d) Thanjavur

6. To which of the following, Marco Polo went in the last decade of 13th century in India?

   a) Chola mandalam
   b) Pandya country
   c) Kongu region
   d) Malainadu

II Fill in the blanks

1. ____________ built the famous Brihadeshwara Temple at Thanjavur.
2. ____________ established a Vedic college at Ennayiram.
3. ____________ was the donor of Velvikudi copper plates.
4. The royal sectretariat of Pandya kingdom was known as ____________.

III Match the Following

1. Madurai	Inland traders
2. Gangaikonda Cholapuram	Maritime traders
3. *Anju- Vannattar*	Capital of Cholas
4. *Mani- gramattar*	Capital of Pandyas

IV. True or False

1. A Muslim state subordinate to Delhi Sultan was in Madurai.
2. Koodal – nagar Kavalan was the title of a Pandya king.
3. Chola kingdom was situated in Vaigai delta.
4. Kulothunga I belonged to Chalukya – Chola dynasty.
5. The elder son of the Chola king was called Yuvaraja.

V Consider the following statements.

Tick (√) the appropriate answer.

1. Which of the following statements about Later Cholas are correct?
   1. They had a system of Local self government.
   2. They maintained a strong navy.
   3. They were the followers of Buddhism.
   4. They built big temples.

   a) 1,2 and 3 b) 2,3 and 4
   c) 1,2 and 4 d) 1,3 and 4
2. Which of the following statements are true with regard to Rajendra Chola?
   1. He assumed the title Gangaikonda Chola.
   2. He conquered Southern Sumatra.
   3. He is credited with consolidating the Chola power.
   4. His naval power enabled him to conquer Srivijaya.

   a) 1 and 2 b) 3 and 4
   c) 1,2 and 4 d) All the above
3. **Assertion:-** The Yuvarajas were appointed Governors in the provinces.
   Reason:- This was done for their training in administration.
   a) R is the correct explanation of A.
   b) R is not the correct explanation of A.
   c) A is wrong and R is correct.
   d) A and R are wrong.
4. Arrange the following administration divisions in descending order.
   1. Nadu 2. Mandalam
   3. Ur 4. Kurram
5. Arrange the events in chronological order.
   1. Maravarman appointed Virapandyan as co – regent.
   2. Civil war broke out.
   3. A Muslim State was established in Madurai.
   4. MaravarmanKulasekaran had two sons – Virapandyan and Sundrapandyan
   5. SundraPandyan sought help from Ala–ud-din Khalji.
   6. Malik Kafur invaded Madurai.
6. Find out

Brahmadeya	
Devadana	
Pallichchandam	
Vellanvagai	

VI Answer in one or two sentences

1. What were the items exported during the later Chola period?

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2. What was called Chatur-vedi-mangalam?

3. Write about Kanikadan.

VII Answer the following in detail

1. Highlight any five aspects of Cholas' legacy.

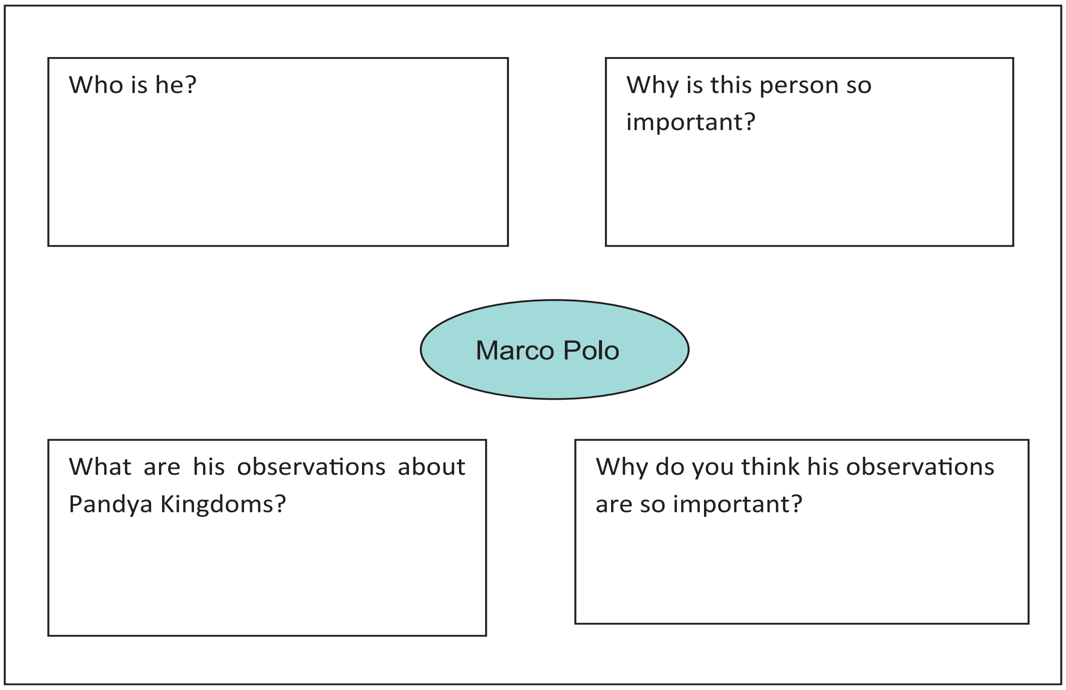
VIII HOTs

1. Chola kings were great patrons of learning: Support the statement with details.

IX Students activity

Who am I?

1. I was responsible for Malik Kafur invasion.
2. I built 16-mile embankment-lake in Gangaikonda Cholapuram.
3. I am a water supply channel.
4. I codified Thirumurai.
5. I was a great port. Marco Polo visited me twice.



X Answer Grid

1. Name the two literary works of Chola period. Ans:	2. Which port is associated with pearl fishery? Ans:
3. What do *kasu, kalanchu* and *pon* refer to? Ans:	4. In which district is Kayal -Pattinam located? Ans:
5. Who was the Pandya king, defeated by Parantaka I? Ans:	6. Where is the famous Meenakshi temple located? Ans:

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XI Field trip

1. Visit any one temple built during Chola or Pandya period and see its magnificence.

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Unit -4

The Delhi Sultanate

Learning Objectives

To acquaint ourselves with

- Turkish Sultans of various dynasties who ruled India from Delhi
- Their military conquests and extension of sovereignty
- Administration of the Delhi Sultanate
- Art and architecture of this period

Introduction

During the eleventh century, the Turkish horsemen pillaged northern India and due to their persistent campaigns, they succeeded in seizing political control of the Gangetic plain by the next century. Though the success of their conquests could be attributed to their audacity and ferocity, their success is really due to the failure of Indians to defend themselves and their territories. Indians viewed each other with distrust, failing to take note of the success of Islam in early years of its spread. The superior military might of Muslim soldiers was yet another factor that contributed to success in their conquests. In this lesson, we discuss how Turkish warriors set about founding and consolidating their Islamic rule till the advent of Babur.

Mamluk Dynasty (1206 - 1290)

Muslim rule in India was established by Muhammad Ghori in 12th century A.D. (CE). As he had no sons, he nurtured special slaves called *bandagan* (a Persian term used for slaves purchased for military service). These slaves were posted as governors and they were later raised to the status of Sultans. After Ghori's death in 1206, one of his slaves Qutb-ud-din-Aibak who had been left behind by Muhammad Ghori to govern the territories he had conqured, proclaimed himself ruler of the Turkish territories in India. He laid the foundation of the Slave Dynasty. This dynasty is also known as Mamluk dynasty. Mamluk is an Arabic word meaning "slave". Qutb-ud-din-Aibak, Shams-ud-din-Iltutmish and Ghiyas-ud-din-Balban were the three great

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Sultans of this dynasty. The Slave Dynasty ruled over the sub-continent for about 84 years.

Qutb-ud-din-Aibak (1206 - 1210)

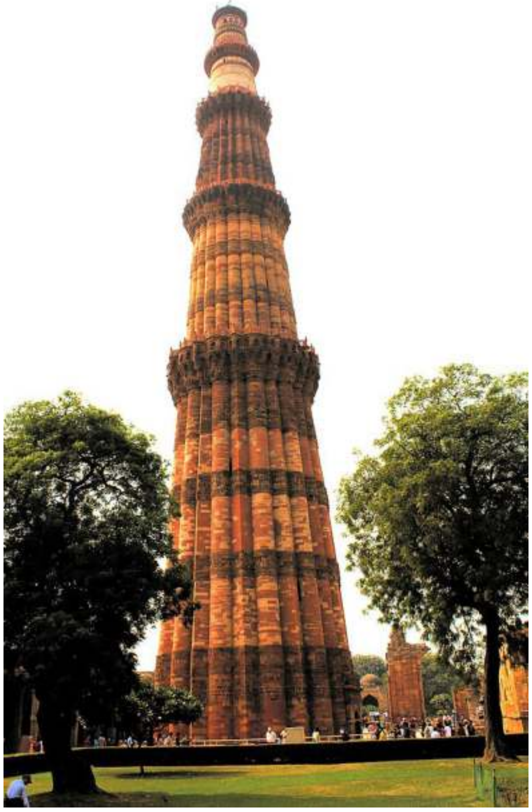
Qutb-ud-din-Aibak began his rule by establishing Lahore as the capital of his kingdom. Later he shifted his capital to Delhi. He was active all through his rule in Delhi conquering new territories and suppressing rebellions. He personally led military campaigns to the central and western Indo-Gangetic plain (north India) and left the conquest of the eastern Gangetic Plain (Bihar, Bengal) to the care of Bakhtiar Khalji. Aibak built the Quwwat-ul-Islam Masjid (mosque) in Delhi. This mosque is considered to be the oldest in India. He also laid the foundation of the Qutb-Minar, but he was unable to complete it. It was later finished by his son-in-law and his successor Iltutmish. Aibak died of injuries received during an accidental fall from a horse, while playing polo in 1210.

Quwwat-ul-Islam Masjid

Iltutmish (1210 - 1236)

Aibak's son Aram Shah proved incompetent and so the Turkish nobles chose Iltutmish, the son-in-law of Aibak as the Sultan, who served as a military commander of Aibak. Iltutmish firmly established his control over the territories by suppressing rebellions. It was during his reign that the threat of Mongols under Chengiz Khan loomed large over the frontiers of India. He averted the impending danger by refusing to provide shelter to the Kwarezm Shah Jalal-ud-din, who had been driven out by Chengiz Khan. In order to counter the possible attack of the Mongols, Iltutmish organised Turkish nobility into a select group of 40 nobles known as *chahalgani* or The Forty.

Iltutmish granted *iqtas* (land) to members of his army. Iqta is the land granted to army officials in lieu of a regular wage. The iqta holder is called the iqtadar or muqti who had to provide the Sultan with military assistance in times of war. The iqtadar collected revenue from his iqta to meet the cost of maintaining his troops and horses.



Qutb-Minar

Iltutmish completed the construction of the Qutb-Minar, started by Aibak. Iltutmish died in April 1236 after ruling for 26 years.

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Razia (1236 - 1240)

As the most capable son of Iltutmish, Rukn-ud-din-Firuz, was dead, Iltutmish nominated his daughter Razia Sultana as his successor to the throne of Delhi. Razia was an able and brave fighter. But she had a tough time with Turkish nobles as she favoured non-Turkish nobles. She also faced the situation of the ferocious Mongols raiding Punjab during her reign.

Razia made an Ethiopian slave named Jalal-ud-din Yakut as her personal attendant and started trusting him completely. This led to a revolt of the Turkish nobles who conspired against her and got her murdered in 1240.

Ghiyas-ud-din Balban (1266 - 1287)

After Razia, three weak rulers in succession ascended the throne. After them came Ghiyas-ud-din Balban. Balban abolished The Forty as it was hostile to him. He established a department of spies to gather intelligence about the conspirators and the trouble makers against his rule. He dealt with insubordination and defiance of royal authority sternly. Tughril Khan, a provincial governor of Bengal, who raised a banner of revolt against Balban, was captured and beheaded. He was ruthless in dealing with enemies like Meos of Mewat (a Muslim Rajput community from north-western India). Balban, however, took care to maintain cordial relationship with the Mongols. He obtained from Hulagu Khan, a grandson of Chengiz Khan and the Mongol viceroy in Iran, the assurance that Mongols would not advance beyond Sutlej.

Tomb of Balban

Balban built forts to guard his empire against the Mongol attacks. He patronised the famous Persian poet Amir Khusru. Balban died in 1287. Balban's son Kaiqubad turned out to be weak. In 1290 Malik Jalal-ud-din Khalji, the commander of the army, assumed the office of Naib (a deputy to the Sultan) and ruled the kingdom in the name of Kaiqubad. Then one day, Jalal-ud-din sent one of his officers and had Kaiqubad murdered. Jalal-ud-din then formally ascended the throne. With him began the rule of Khalji dynasty.

Khalji Dynasty (1290 - 1320)

Jalal-ud-din Khalji (1290 - 1296)

There were many military campaigns during the reign of Jalal-ud-din. But they were mostly organised and led by his nephew, Ala-ud-din, the governor of Kara. One significant military expedition was against the Deccan kingdom Devagiri. Ala-ud-din, after defeating the Yadava king Ramachandra, plundered the city and returned with huge wealth. Ala-ud-din treacherously killed Jalal-ud-din after buying off the prominent nobles and important commanders with the wealth he had brought from the Deccan and declared himself as the Sultan of Delhi in 1296.

Ala-ud-din Khalji (1296 - 1316)

Ala-ud-din Khalji consolidated the Delhi Sultanate. The range of his conquests is impressive: in the Punjab (against the Mongols), in Rajasthan and in Gujarat. With his northern frontiers secure, he sent his chief lieutenant

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Malik Kafur into the southern parts who took even the distant Madurai in 1310. The Yadavas of Devagiri, the Kakatias of Warangal, the Hoysalas of Dwarasamudra and the Pandyas of Madurai accepted Ala-ud-din's suzerainty.

Sack of Chittor (1303): When Ala-ud-din's army overwhelmed the Rajput army in Chittor and in the context of threat of defeat, the men and women of the fortress, in accordance with their old custom, performed the rite of jauhar. According to this custom, left with no other way to survive, the men would go out and die in the field of battle and women would burn themselves on a pyre.

Chittor Fort

Ala-ud-din's political and administrative reforms were as impressive as his military conquests. Ala-ud-din undertook a survey of the agrarian resources around his capital and fixed a standard revenue demand. He entrusted the task of collecting the revenue to the military officers. This measure deprived the local chiefs and rajas of their time memorial privilege. Ala-ud-din established a system of forced procurement of food grains for Delhi and other garrison centres. The procurement prices were fixed and grain collected as tax was stored in state granaries. In order to ensure the enforcement of his new regulations, he employed spies who were responsible to report to him directly.

Ala-ud-din died in 1316. The failure of his successors to retain power led to the seizure of power by Ghiyas-ud-din Tughluq, who founded the Tughluq dynasty.

Tughluq Dynasty (1320 - 1414)

Ghiyas-ud-din (1320 - 1324)

One of the major tasks of Ghiyas-ud-din as the Sultan was to recover the territories that the Sultanate had lost during the turmoil following the death of Ala-ud-din. Ghiyas-ud-din Tughluq sent his son Jauna Khan to fight against Warangal. Jauna Khan defeated Pratabarudra of Warangal and returned with a rich booty. With this looted wealth, Ghiyas-ud-din is said to have laid the foundation of the city Tughluqabad near Delhi. However, as Ala-ud-din treacherously killed his uncle, Jauna Khan was said to have killed his father and ascended the throne with title Muhammad-bin-Tughluq in 1325.

Muhammad-bin-Tughluq (1325 - 1351)

Muhammad-bin-Tughluq was a learned man. Yet he was a person of cruelty. Ala-ud-din had conquered, looted and left the old ruling families as his dependents. In contrast, Muhammad Tughluq dreamt of making the whole of the subcontinent his domain. With the view to facilitating extended sovereignty, he shifted his capital from Delhi to the centre of the kingdom, namely Devagiri. He also changed its name to Daulatabad. When Muhammad himself decided that the move was a mistake, he ordered a return to Delhi as the capital again. When Ibn Battuta, the Morocco traveller who was with the Sultan, returned to Delhi, he found Delhi 'empty, abandoned and had but a small population'.

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When Muhammad-bin-Tughluq moved his capital from Delhi to Daulatabad, he displaced all the citizens of Delhi and also the cattle.

Tughluq changed the Ala-ud-din's system of revenue collections in grain and ordered that land revenue, which was increased, should henceforward be collected in money. This proved disastrous during famines. When he discovered that the stock of coins and silver was inadequate for minting, he issued a token currency in copper. Counterfeiting soon became order of the day and, as a result, the entire revenue system collapsed. Trade suffered as foreign merchants stopped business. This forced Sultan to withdraw the token currency and pay gold and silver coins in exchange. This move led the state to become bankrupt. Tughluq increased land tax in the Doab region, which triggered peasant revolts. As the revolts were cruelly dealt with, peasants abandoned cultivation, which resulted in the outbreak of frequent famines.

Coins of Muhammad-bin-Tughluq

Tughluq ruled as Sultan for 25 years. During his long reign, he had to face many revolts of the provincial governors. The Governors of Awadh, Multan and Sind revolted and declared themselves independent. In South India, several states arose. The new Daulatabad and the conquered territories around them were declared independent sultanate called Bahmani. Its founder after whom it was named, was a soldier formerly in Tughluq service. Madurai was proclaimed a separate sultanate in 1335. Bengal became independent in 1346. Tughluq died on 23 March 1351.

Firoz Shah Tughluq (1351 - 1388)

Tomb of Firoz Shah Tughluq

Firoz, the son of Ghiyas-ud-din's younger brother, succeeded Muhammad-bin-Tughluq. Firoz could neither suppress revolts nor win back the provinces that had broken away. He also showed no interest in re-conquering the southern provinces. He refused to accept an invitation (c. 1365) from a Bahmani prince to intervene in the affairs of the Deccan. Firoz rewarded Sufis and other religious leaders generously and listened to their advice. He also created charities to aid poor Muslims, built colleges, mosques, and hospitals. He adopted many humanitarian measures. He banned inhuman punishments and abolished taxes not recognised by Muslim law.

He promoted agriculture by waiving off the debts of the agriculturalists and constructing

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many canals for irrigation. He laid out 1200 new gardens and restored 30 old gardens of Ala-ud-din-Khalji. He had built new towns such as Firozabad, Jaunpur, Hissar and Firozpur.

Despite adopting a peaceful approach and taking efforts to organise the Sultanate well, he had to spend his last days in unhappiness. His own son Muhammad Khan revolted against him and Firoz Shah died in September 1388, at the age of 83.

Timur's Invasion (1398)

The sacking and massacre by Tamerlane or Timur of Delhi came a decade after Firuz Shah Tughluq died. As a ruler of the region around Samarkand in Central Asia, Timur had occupied some parts in the north-west of India. Taking advantage of India's weakness, he entered India in December 1398 and plundered Delhi. Punjab, besides the Delhi city, was the province that suffered most by Timur's raid. Timur, apart

from carrying huge wealth in the form of gold, silver, jewels, also took along Indian artisans like carpenters and masons to work on monuments in Samarkand.

Sayyid Dynasty (1414 - 1451)

Though the Sultanate fragmented into a number of independent kingdoms, it endured for 114 years more, till the Mughal invasion. Before leaving Delhi, Timur had left behind his representative Khizr Khan as the governor of the territories he had conquered (Delhi, Meerut and Punjab). He founded the Sayyid Dynasty in 1414, which lasted till 1451. The last ruler of this dynasty, Ala-ud-din Alam Shah, abdicated the throne in 1451. This gave Bahlol Lodi, then the governor of Sirhind (Punjab), the opportunity to become the new Sultan of Delhi, leading to the establishment of Lodi dynasty.

Lodi Dynasty (1451 - 1526)

In 1489, Bahlol Lodi was succeeded by his son Sikandar Lodi. Sikandar was a patron of arts and learning. He founded the city of Agra and made it his capital. He died in 1517 and was succeeded by his son, Ibrahim Lodi, who was defeated by Babur in 1526 in the Panipat battle. Thus the Lodi dynasty and the Delhi Sultanate were ended by Babur who went on to establish the Mughal Empire in India.

Islamic art and architecture: The mansions of high-ranking Muslim nobles, soldiers and officials were built first in cities and the neighbourhoods. Around them, the mosques in the imperial style were constructed by successive Muslim regimes in Delhi. Mosques and Madrasas looked architecturally different. The graceful decorations of doorways and walls with lines from the Koran made a distinct appearance in these buildings. The shape of all these buildings was Persian, while the decoration was Indian. So, it is called Indo-Saracenic architecture. Qutb Minar, Alai-Darwaza, Quwwat-ul Islam Masjid, Moth-ki-Masjid, the tombs of Iltutmish, Balban and the forts of Daulatabad and Firozabad were all constructed in this style.

Daulatabad Fort

Alai-Darwaza

Summary

- Establishment of Muslim rule in India by Muhammad Ghori
- Slave dynasty founded by Qutb – ud- din- Aibak and consolidated by his Son-in-law Iltutmish
- Razia, the daughter of Iltutmish, a brave fighter and a great administrator
- Balban's espionage system and the abolition of The Forty, to reduce the power of Turkish nobles

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- Ala – ud- din- Khalji as the founder of Khalji dynasty - his military conquests and administrative reforms
- Firoz Shah Tughluq as a compassionate ruler with his concentration on the well - being of the people
- The sacking of Delhi by Timur
- Khizr Khan founding the Sayyid dynasty and Bahlol Lodi the governor of Sirhind establishing the Lodi dynasty
- The first battle of Panipat paving the way for the foundation of Mughal Empire by Babur in A.D. (CE)1526

Glossary

impending	about to happen	எக்கணமும் நடைபெற இருக்கிற/ அச்சுறுத்தும் நிலையில் இருக்கிற
ferocious	cruel, violent	மூர்க்கமான/ அச்சம் தருகிற வகையில்
conspirator	someone who conspires secretly with other people to do something unlawful or harmful	சதிகாரர்கள்
patron	supporter, promoter	புரவலர்
plunder	to steal goods forcibly from a place especially during a war	கொள்ளையடி
procurement	the process of getting supplies	கொள்முதல்
disastrous	causing great damage	பேரழிவு
fragment	break into pieces	துண்டு துண்டாக
counterfeit	fake	போலியான
waiving	exempting	விலக்கு அளி

Evaluation

I Choose the correct answer

1. ____________laid the foundation of 'Mamluk' dynasty.

   a) Mohammad Ghori
   b) Jalal-ud-din
   c) Qutb-ud-din Aibak
   d) Iltutmish

2. Qutb-ud-in shifted his capital to Delhi from______________.

   a) Lahore b) Poona
   c) Daulatabad d) Agra

3. ______________ completed the construction of the Qutb-Minar.

   a) Razia
   b) Qutb-ud-din -Aibak
   c) Iltutmish
   d) Balban

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4. __________ laid the foundation of the city Tughluqabad near Delhi.

a) Muhammad-bin -Tughluq
b) Firoz shah Tughluq
c) Jalal –ud-din
d) Ghiyas –ud-din

II Fill in the Blanks

1. ____________ was the founder of Tughluq dynasty.
2. Muhammad–bin-Tughluq shifted his capital from Delhi to____________.
3. _____________ patronized the famous Persian poet Amir Khusru.
4. Quwwat-ul-Islam Masjid in Delhi was built by_______________ .
5. The threat of Mongols under Chengizkhan to India was during the reign of___________________________.

III Match the following

1.	Tughril Khan	-	Governor of Kara
2.	Ala-ud-din	-	Jalal-ud-din Yakut
3.	Bahlol Lodi	-	Governor of Bengal
4.	Razia	-	Governor of Sirhind

IV State true or false

1. Qutb-ud-din Aibak died of mysterious fever.
2. Razia was an able and brave fighter.
3. The Turkish nobles chose Iltutmish, son of Aibak, as Sultan after the death of Aibak.
4. FirozShah Tughluq refused to accept an invitation from a Bahmani Prince to intervene in the affairs of the Deccan.

V. Match the statement with the reason.Tick the appropriate answer

1) Assertion (A)**:**Balban maintained cordial relationship with Mongols

Reason (R)**:** The Mongol ruler, a grandson of Chengiz Khan, assured that Mongols would not advance beyond Sutlej.

a) R is the correct explanation of A.
b) R is not the correct explanation of A.
c) A and R are wrong.
d) A is wrong and R is the correct.

2) Find out the correct pair

a)	Hoysala	-	Devagiri
b)	Yadavas	-	Dwarasamudra
c)	Kakatias	-	Warrangal
d)	Pallavas	-	Madurai

3) Find out the wrong statement

a) After Ghori's death in 1206, his slave Qutb-ud-din Aibak proclaimed him self the ruler of the Turkish territories in India.
b) Razia established the department of spies to gather intelligence about the conspirators and the trouble makers against her rule.
c) Balban built forts to guard his empire against the Mongol attack.
d) Ibrahim Lodi was defeated by Babur in 1526.

VI Answer the following in one or two sentences

1. Name the land granted to army officials in lieu of a regular wage.
2. Who founded the city of Agra?
3. Name the ruler who established Muslim rule in India in 12th century A.D (CE).
4. Write a note on *chahalgani*.

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5. How did Ala-ud-din Khalji consolidate the Delhi Sultanate?

6. List out the contributions of Firoz Shah Tughluq.

VII Answer the following

1. Write about the invasion of Timur in 1398.

VIII HOTs

1. How would you evaluate Muhammad-bin-Tughluq as Sultan of Delhi?

IX. Map Work

On the river map of India draw the extent of Tughluq Dynasty and mark the following places.

1. Delhi

2. Devagiri

3. Lahore

4. Madurai.

X Student Activity

1. Match the Father with Son

1. Qutb-ud-din Aibak	Rukn-ud-din-Firuz
2. Iltutmish	Kaiqubad
3. Balban	Ala-ud-din
4. Ghiyas-ud-din	Sikandar Lodi
5. Bahlol Lodi	Aram Shah

2. Prepare an album of pictures of Islamic art and architecture of the Delhi Sultanate .

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ICT CORNER

The Delhi Sultanate

PROCEDURE :

Step 1: Open the Browser and type the URL given below (or) Scan the QR Code.

Step 2: Keep Scrolling and go to 'Timeline'

Step 3: Click any period and you can explore the historical events with pictorial descriptions (ex. Delhi Sultanate)

The Delhi Sultanate URL:

https://delhi-timeline.in/ (or) scan the QR Code

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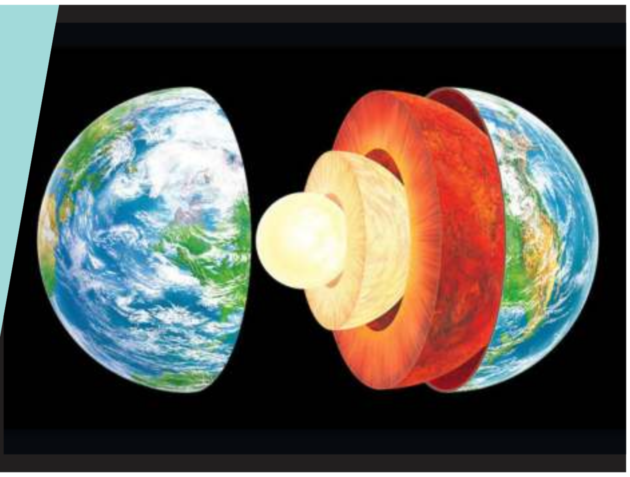
GEOGRAPHY

Unit -1

Interior of the Earth



Learning Objectives

- To know about the interior of the earth
- To understand the movements of earth plates
- To learn about earthquakes and volcanoes

Introduction

The earth, our homeland, is a dynamic planet. The earth's surface has lofty mountains, high plateaus, large plains and deep valleys etc. The earth's surface is constantly undergoing changes inside and outside. Have you ever wondered what lies in the interior of the earth? What is the earth made up of? Let us learn about this in detail.

Interior of the Earth

The structure of the earth may be compared to that of an apple.On the basis of the study of earthquake waves the spherical earth is found to be three concentric layers. They are:

1. The crust,
2. The mantle and
3. The core.

1. The Crust

The crust is the outermost layer of the earth. Its thickness varies from 5 to 30 km. It is about 35 km on the continental masses and only 5 km on the ocean floors. Despite greater thickness, the continental crust is less dense than the oceanic crust because it is made of both light and dense rock types. The oceanic crust is composed mostly of dense rocks such as basalt.

DO YOU KNOW?

Earth is called as blue Planet. 71% of the earth is covered by water.

The crust comprises two of distinct parts. The upper part consists of granite rocks and forms the continents. It has the main mineral constituents of silica and alumina. So it is referred to as Sial. It has an average density of 2.7g/cm^3.

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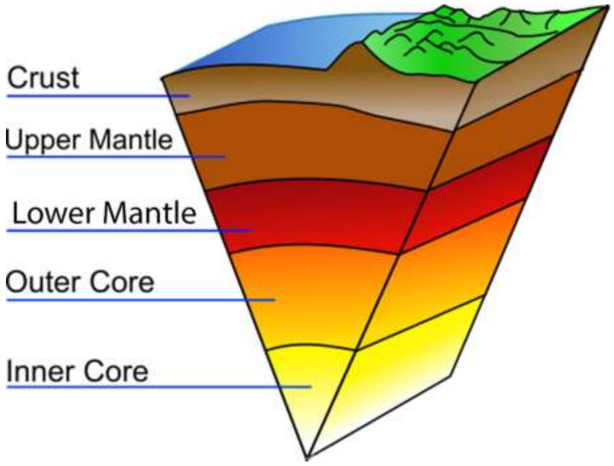
The lower part is a continuous zone of denser basaltic rocks forming the ocean floors, comprising mainly of silica and magnesium. It is therefore called Sima. It has an average density of 3.0g/cm³. The sial and the sima together form the earth's crust. Since the sial is lighter than the sima, the continents can be said to be 'floating' on a sea of denser sima.



Structure of the Earth

2. The Mantle

The next layer beneath the crust is called the mantle. It is separated from the crust by a boundary called Mohorovicic discontinuity. The mantle is about 2,900 km thick. It is divided into two parts. (i) The upper mantle with a density of 3.4 – 4.4g/cm³· extends down to 700 km. (ii) The lower mantle having a density of 4.4 – 5.5g/cm³ extends from 700 to 2,900 km.

Why the interior of the earth is so hot?

3. The Core

The innermost layer of the earth is called the core. It is also known as *barysphere*. It is separated from the mantle by a boundary called *Weichart-Gutenberg discontinuity*. The core is also divided into two parts.

(i) **The outer core,** which is rich in iron, is in liquid state. It extends between 2,900 – 5,150 km.

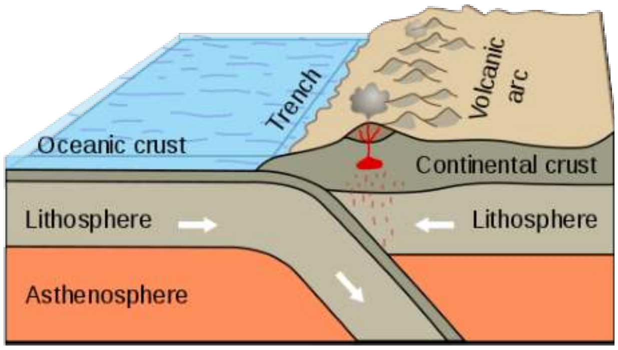
(ii) **The inner core**, composed of Nickel and Ferrous *(Nife)*, is solid in state. The central core has very high temperature and pressure. It extends from 5,150 km to 6,370 km. The average density of core is 13.0 g/cm³

DO YOU KNOW?

The crust forms only 1% of the volume of the earth, 84% consists of the mantle and 15% makes the core. The radius of the earth is 6,371km.

The Earth Movements

The lithosphere is broken into a number of plates known as the *Lithospheric plates*. Each plate, oceanic or continental moves independently over the asthenosphere. The movement of the Earth's lithospheric plates is termed as tectonic movements. The energy required to move these plates is produced by the internal heat of the earth. These plates move in different directions at different speed.



Lithospheric Plates

At places, these plates move away from each other creating wide rifts on the earth's surface. At some places, these plates come closer and collide. When an oceanic plate collides with a continental plate, the denser oceanic plate is forced below the continental plate. As a result of the pressure from above the rocks heats up and melts. The molten rocks rise again forming volcanic mountains along

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the continental edge. Alternatively, a trench may be formed between two plates

In some cases when two continental plates converge, neither plate can be forced under the other. Instead, folds may be created. Great mountain ranges like the Himalayas have been formed in this way.

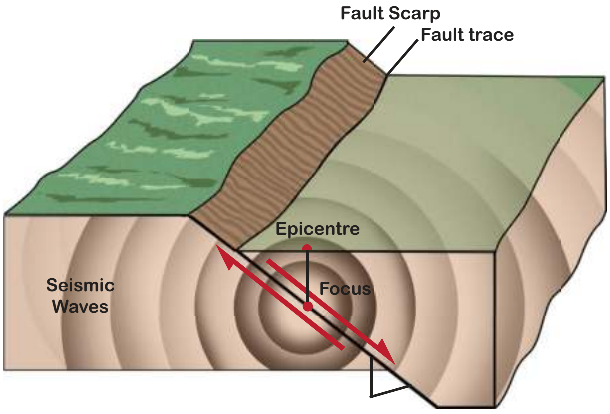
The movement of these plates causes changes on the surface of the earth. The earth movements are divided on the basis of the forces which cause them. The forces which act in the interior of the earth are called as Endogenic forces and the forces that work on the surface of the earth are called as Exogenic forces.

Endogenic forces produce sudden movements and Exogenic forces produce slow movements. Endogenic movements produce earthquakes and volcanoes that cause mass destruction over the surface of the earth.

> **DO YOU KNOW?** The asthenosphere is the part of the mantle that flows and moves the plates of the earth.

Earthquake

A sudden movement of a portion of the earth's crust which produces a shaking or trembling is known as an earthquake. The point where these vibrations originate is called the



Earthquake

focus of the earthquake. The point of the earth's surface directly above the focus is called the epicentre of the earthquake. From the focus, the earthquake vibrations travel in different directions in the form of seismic waves.

The earthquake waves are recorded by an instrument known as seismograph. The magnitude of an earthquake is measured by the Richter scale. The numbers on this scale range from 0 to 9.

Causes of Earthquake

The chief cause of earthquake is the sudden slipping of the portion of the earth's crust along fractures or faults. The movement of the molten rocks underneath the surface produce strains which break the rocks apart. The sudden shifting of landmass causes upheavals in the crust of the earth sending vibrations or waves into the surrounding portions of the earth. Sometimes the surface of the earth itself cracks.

Effects of Earthquakes

Earthquakes may cause changes in the earth's surface. Vibrations often set landslides in mountainous regions. A greater danger in an earthquake is the falling of buildings. Most of the houses which collapsed were made of mud and bricks and proved to be death traps. Underground water system is naturally disturbed by such movements. Fire is another great danger.

> There are three types of earthquake waves:
> P waves or longitudinal waves
> S waves or transverse waves
> L waves or surface waves

An earthquake which originates below or near the sea causes great disturbance in the water. The floods and waves cause great loss of life, sometimes more than the earthquake

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itself. Tsunami, a Japanese term, is the name given to the huge waves caused in the sea by an earthquake. Tsunamis are quite common along the coasts of Japan and other regions in the Pacific Ocean.

On 26th December 2004, Tsunami in the Indian Ocean swept coastal area of Indonesia, India, Srilanka, Thailand etc., They caused immense damage to life and property in the coastal area

Distribution of Earthquakes

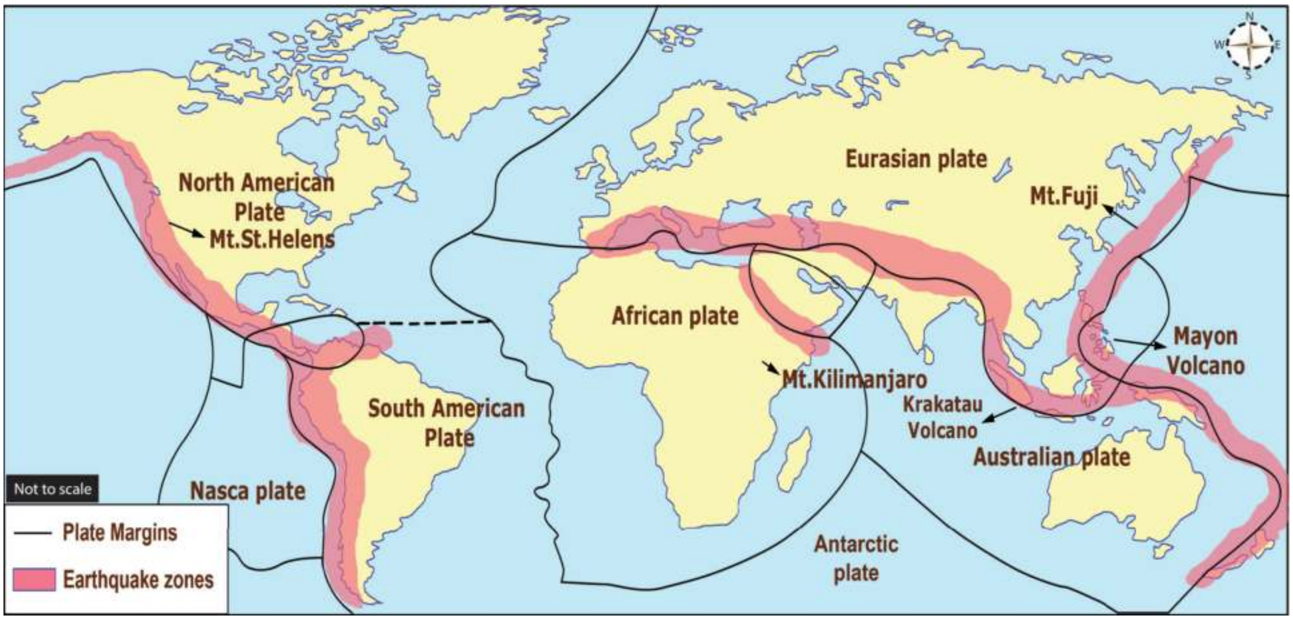
The world's distribution of earthquakes coincide very closely with that of volcanoes. Regions of greatest seismicity are circum-Pacific areas, with the epicenters and the most frequent occurrences along the Pacific Ring of Fire. It is said that about 68 % of earthquakes occur in this belt. Remaining 31 % of earthquakes take place in the Mediterranean-Himalayan belt including Asia Minor, the Himalayas and parts of north-west China. The remaining percent of earthquakes occur in Northen Africa and Rift valley areas of the Red sea and Dead sea.

In India, the Himalayan region and the Ganga-Brahamaputra valley are prone to earthquakes. A number of earthquakes have been experienced in this region. Some of them were very severe and caused extensive damage, e.g., the earthquake of Uttar Kashi in 1991 and Chamoli in 1999. The Deccan Plateau, which was supposed to be comparatively free from the dangers of the earthquakes, has experienced two severe earthquakes in the past, the Koyna (Maharashtra) earthquake in 1967 and the Latur earthquake in 1993.

Volcanoes

A volcano is a vent or an opening in the earth's crust through which hot magma erupts from deep below the surface. The opening is usually circular in form. Volcanic eruptions may also take place through a long crack or fissure through which steam and other materials flow out.

The molten rock material within the earth, together with gases, is called magma. After it rises to the surface, it is called as lava.



Distribution of Earthquakes

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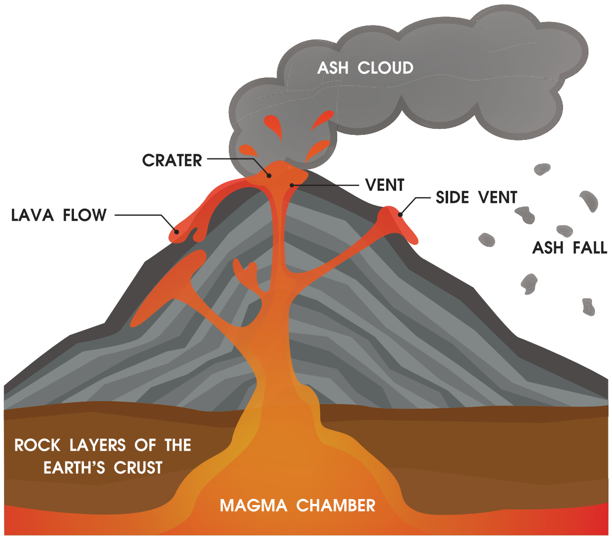


Volcano

In course of time, lava and other materials flow out of a volcano accumulate around the opening and form a conical hill or a mountain vent is an openning or mouth of a volcano. The top of this cone is usually marked by a funnel-shaped depression, which is called a *crater*. If the crater of a volcano is of great size and is shaped like a basin, it is called a *caldera*. Calderas are caused by violent explosions which blow away entire tops of great cones.

Causes of Volcanic Activity

The temperature increases as the depth increases at the rate of 1°c for every 32 metres. There is also great pressure. At a depth of about 15 km the pressure is about 5 tonnes per $cm^2$of rock. Under these circumstances, the interior of the earth is in a semi-molten state called magma. The magma, under great pressure has the capacity to dissolve great volume of gas; some gases are also combustible. This makes volcanic material burst forth through the weak spots in the earth's crust.

The scientific study of valcanoes are called **volcanology**.

People who study valcanoes are called **volcanologists**.

Nature of volcanic eruptions

Sometimes, magma rises slowly to the surface and spreads over a vast area. This is known as fissure eruption. Some plateaus and plains have been formed in this way, e.g., Deccan Plateau in India and the Colombian Plateau in North America. If the magma rises quickly to the surface, lava is thrown high into the atmosphere. Besides lava, ash, steam, gases and pieces of rocks are also thrown out. This type of eruption is known as explosive eruption. The terrible explosion on 27th August 1883 in the island of Krakatoa, Indonesia is an example for explosive type of eruption.

The viscosity of lava is determined by the amount of silica and water in magma. Highly viscosity lava is rich in silica and has little water. Low viscosity lava has little silica, but a lot of water. It moves rapidly forming smooth flows.

DO YOU KNOW?

Barren island is situated in the Andaman Sea, and lies about 138 km northeast of the territory's capital. It is only in active volcano along the chain from sumatra to myanmar. Last eruption occurred in 2017.

Types of Volcanoes

Volcanoes are classified according to their periodicity of eruptions and the state of activity such as

1. Active Valcano
2. Dormant Valcano
3. Extinct Valcano

1. Active Valcano

Valcanoes that erupt frequently are called active volcanoes. Most of the active volcanoes lie in the Pacific Ring of Fire belt which lies along the Pacific coast. There are about 600 active

volcanoes in the world, such as Mt. Stromboli in Mediterranean Sea, St.Helens in USA, Pinatubo in Philippines. Mauna Loa in Hawaii is the world's biggest active volcano.

> **DO YOU KNOW?**
> Stromboli is known as the 'light house of Mediterranean sea'

2. Dormant Valcano

These volcanoes have shown no sign of activity for many years but they may become active at any time. These are called Sleeping Volcanoes. Vesuvius mountain of Italy, Mt Fujiyama of Japan, Mt. Krakatoa of Indonesia are famous examples of this types.

3. Extinct volcano

A Volcano has not erupted in past 1000 years is often listed as Extinct volcanoes. The top of extinct volcanic mountains have been eroded. Mt Popa of Myanmar and Mt. Kilimanjaro and Mt. Kenya of Africa are examples of extinct volcanoes.

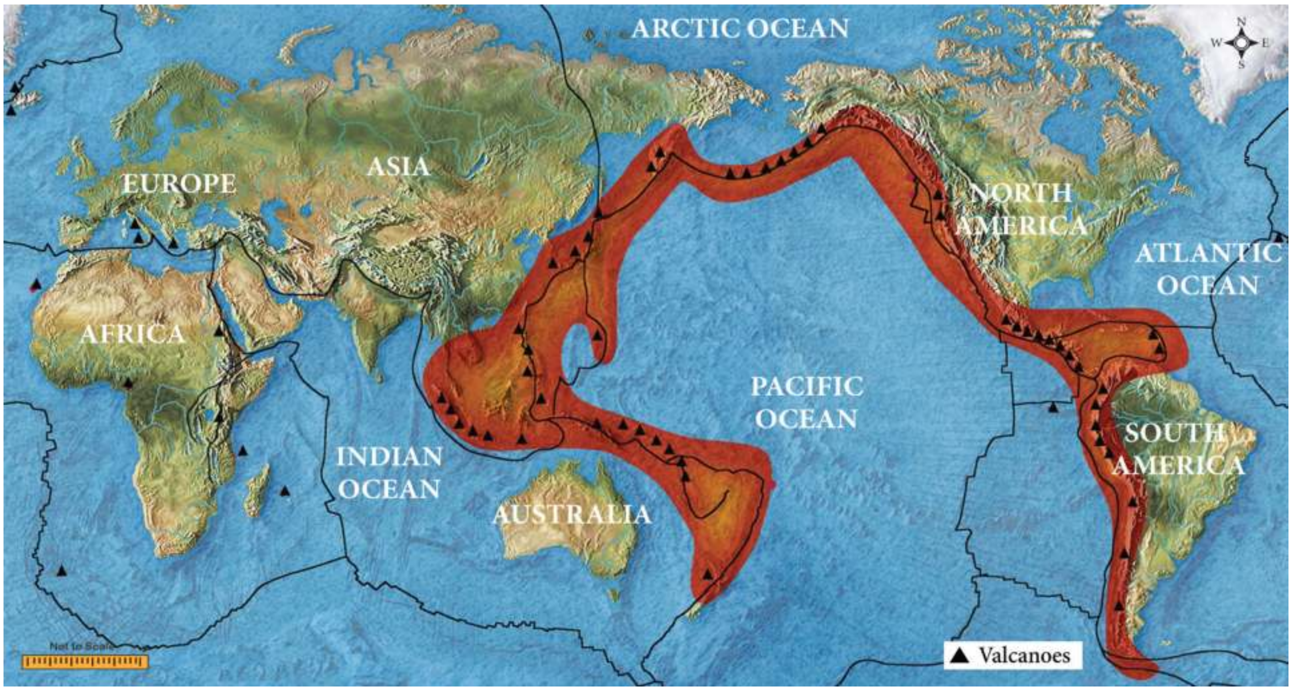
Distribution of Volcanoes in the world

Volcanoes are located in a clearly-defined pattern around the world. They are closely related to regions that have been intensely folded or faulted. There are about 600 active volcanoes and thousands of dormant and extinct ones. They occur along the coastal mountain ranges, as off-shore islands and in the midst of oceans, but there are a few in the interior of continents. The volcanic belts are also the principal earthquake belts of the world. There are three major zones of volcanic activities in the world. They are:

1. The Circum – Pacific belt
2. The Mid continental belt
3. The Mid Atlantic belt

1. Circum Pacific Belt

This is the volcanic zone of the convergent oceanic plate boundary. It includes the volcanoes of the eastern and western coastal areas of Pacific Ocean. This zone is popularly termed as the Pacific Ring of Fire which has been estimated to include two-thirds of the world's volcanoes.



Pacific Ring of Fire

2. Mid continental belt

This is the volcanic zone of convergent continental plate boundaries that includes the volcanoes of *Alpine mountain chains*, the *Mediterranean Sea and the fault zone of eastern Africa*. The important volcanoes are Vesuvius, Stromboli, Etna, Kilimanjaro and Kenya. Surprisingly, the Himalayas have no active volcanoes at all.

3. Mid Atlantic Belt

This belt represents the divergent boundary of plates located along the mid-Atlantic ridges. Volcanoes of this area are mainly of fissure eruption type. Iceland is the most active volcanic area and is located on the mid-Atlantic ridge. St. *Helena* and *Azores* Island are other examples.

Summary

- The Earth's interior structure is compared with that of an apple
- The crust is the outer-most layer of the earth.
- The upper part of the earth crust is SIAL.
- The lower part of the earth crust is SIMA.
- The mantle is about 2900km thick.
- The lithosphere is broken into a number of plates known as the lithospheric plates
- The earthquake waves are recorded by an instrument known as seismograph.
- Tsunami is caused by an underwater earthquake.
- A Volcano is vent or opening in the earth crust through which magma comes out.
- The Shape of a volcano depends on the type of lava and force of the eruption.
- There are three major zone of volcanic activity in the world.

Glossary

Core	The inner most layer of the earth	கருவம்
Mantle	The second layer beneath the crust	கவசம்
Mohorovicic discontinuity	Boundary that separated the mantle from the crust	மோஹோரோவிசிக் எல்லை
Land slide	Downward movements of rock debris of the mountain	நிலச்சரிவு
Seismograph	Instrument to measures the magnitude of an earthquake	சீஸ்மோகிராப்
Tsunami	Sea waves caused by an underwater earthquake or a volcanic eruption under sea.	ஆழிப்பேரலை
Vent	An opening a the earth surface from which volcanic material is emitted	எரிமலைவாய்
Magma	The molten state of rocks	பாறைக்குழம்பு
Lava	The solidified form of magma after it reaches the surface of the earth	எரிமலைக்குழம்பு

Evaluation

I. Choose the correct answer

1. Nife is made up of ____________ .
   a) Nickel and ferrous
   b) Silica and aluminum
   c) Silica and magnesium
   d) Iron and magnesium

2. Earthquake and volcanic eruption occur near the edges of _______________.
   a) Mountain   b) Plains
   c) Plates   d) Plateaus

3. The magnitude of an earthquake is measured by _______________.
   a) Seismograph   b) Richter scale
   c) Ammeter   d) Rotameter

4. The narrow pipe through which magma flow out is called a _______________.
   a) Vent   b) Crater
   c) Focus   d) Caldera

5. ______________ Volcano is known as light house of Mediterranean Sea.
   a) Stromboli   b) Krakota
   c) Fujiyama   d) Kilimanjaro

6. ___________ belt is known as the "Ring of Fire".
   a) Circum - Pacific   b) Mid-Atlantic
   c) Mid - Continental   d) Antarctic

II. Fill in the blanks

1. The core is separated from the mantle by a boundary called _______________.
2. The earthquake waves are recorded by an instrument known as ___________.
3. Magma rises to the surface and spreads over a vast area is known as ___________.
4. An example for active volcano is _______________.
5. Seismology is the study of ___________.

III. Circle the odd one

1. crust, magma, core, mantle
2. focus, epicenter, vent, seismic waves
3. Uttar Kashi, Chamoli, Koyna, Krakatoa
4. lava, caldera, silica, crater
5. Stromboli, Helens, Hawaii, Fujiyama

IV. Match the following

1.	Earth quake	-	Japanese term
2.	Sima	-	Africa
3.	Pacific Ring of Fire	-	Sudden movement
4.	Tsunami	-	Silica and magnesium
5.	Mt. Kenya	-	World volcanoes

V. Consider the following statement and (√) Tick the appropriate answer

1. **Assertion (A):** There structure of the earth may be compared to that of anApple.
   Reason (R): The interior of the earth consists of crust, mantle and core.
   a) A and R are correct and R explains A
   b) A and R are correct but R does not explain A
   c) A is incorrect but R is correct
   d) Both A and R are incorrect

2. **Assertion (A):** The Pacific Ocean includes two thirds of the world's volcanoes.
   Reason (R): The boundary along the Eastern and Western coast areas of the Pacific Ocean is known as the Pacific Ring of Fire.
   a) A and R are correct and R explains A
   b) A and R are correct but R does not explain A
   c) A is incorrect but R is correct
   d) Both A and R are incorrect

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VI. Answer in a word

1. Name the outer most layer of the earth.
2. What is SIAL?
3. Name the movement of the Earth's lithospheric plates?
4. Give an example of extinct volcano.

VII. Answer the following briefly

1. What is mantle?
2. Write note on the core of the earth?
3. Define Earthquake.
4. What is Seismograph?
5. What is a volcano?
6. Name the three types of volcanoes based on periodicity of eruption.

VIII. Give reason

1. No one has been able to take samples from the interior of the earth
2. The Continental crust is less dense than the oceanic crust

IX. Distinguish between

1. SIAL and SIMA
2. Active volcano and dormant volcano

X. Answer the following in detail

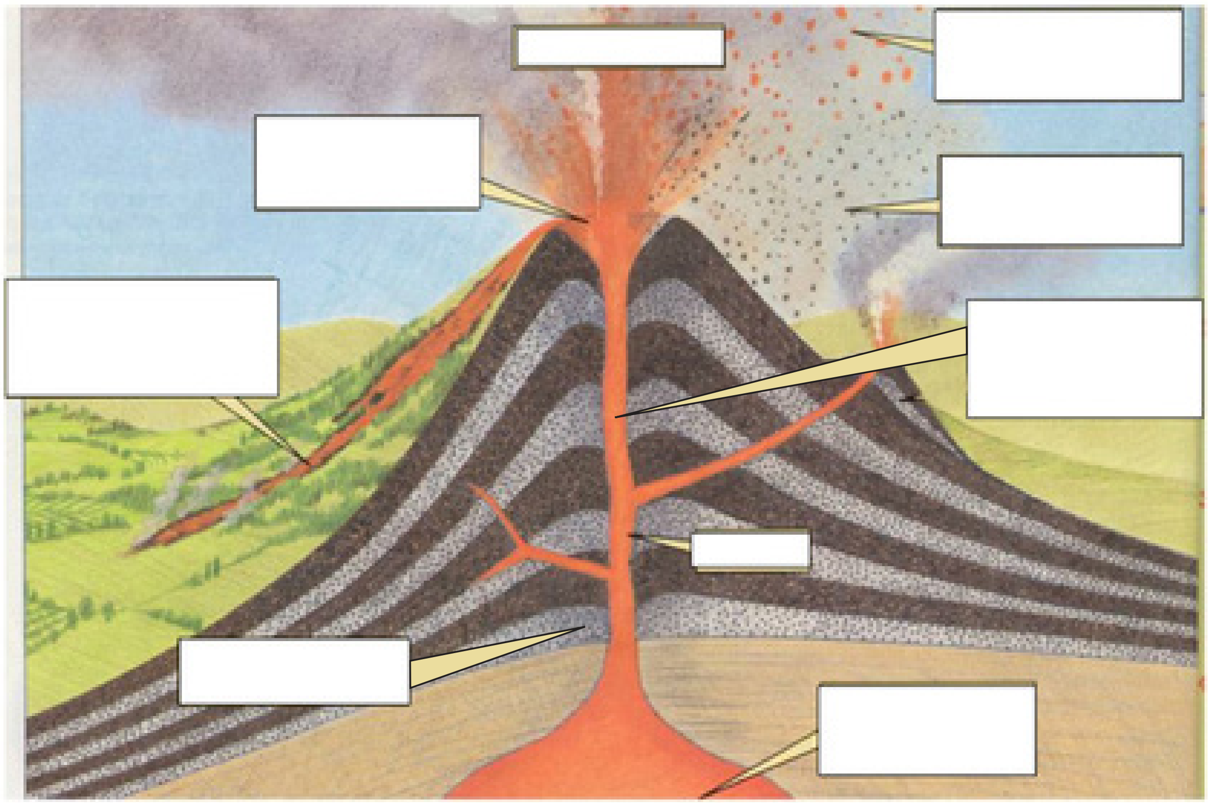
1. Write about the effects of an earthquake?
2. Describe the classification of volcanoes based on the eruptions.
3. Name the major zones of volcanic activity and explain any one.

XI. HOTs

1. The earth's interior is very hot. Why?
2. Are Volcones Destructive (or) Constructive?
3. How does volcaone make an Island?

XII. Activity

1. Prepare an album on earthquake and volcanoes.
2. Label the parts of volcano.



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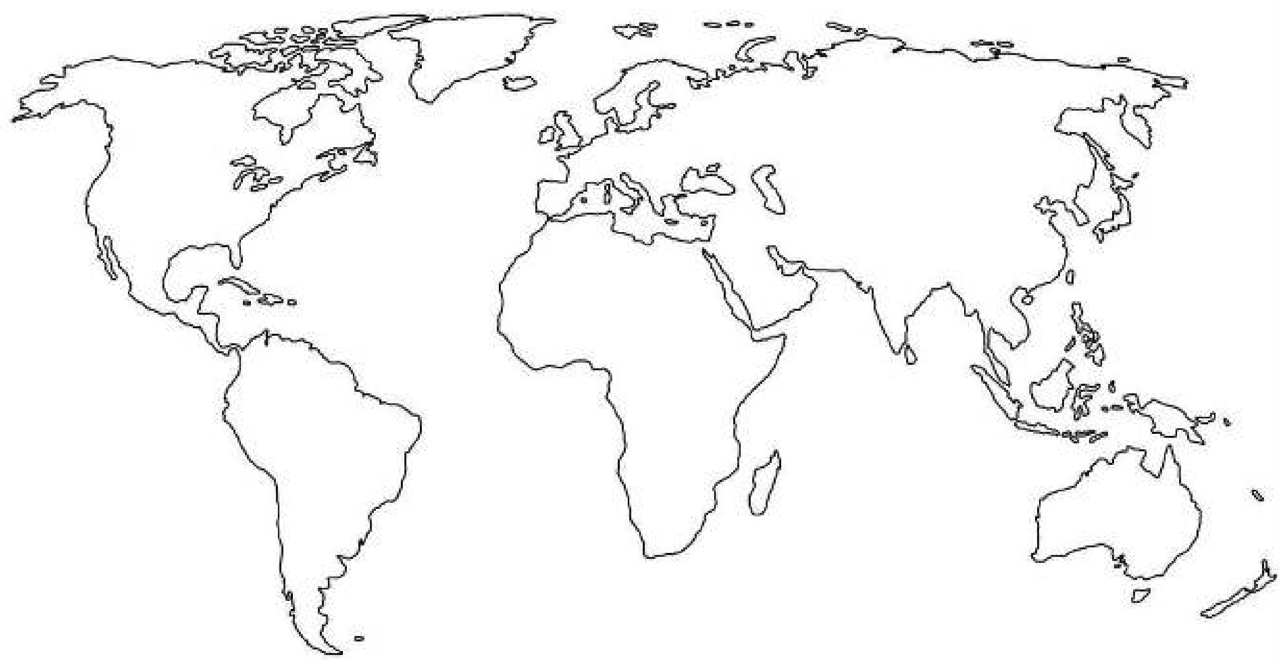
3. On an outline map of the world, mark the Pacific Ring of Fire



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1. Majid Husain, *Physical Geography,* Anmol Publication Pvt Ltd
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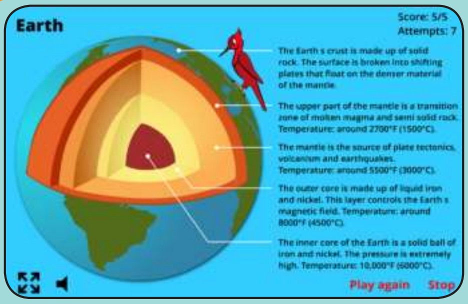
3. Goh Cheng Leong, *certificate Physical and Human Geography*, Oxford University press.
4. Savindra Singh (2015) *physical Geography,* Pravalika publications Allahabad.

ICT CORNER

Interior of the Earth

select full screen mode and play the game with descriptions



PROCEDURE

Step 1: Open the Browser and type the URL given below (or) Scan the QR Code.

Step 2: Click on the Map to start

Step 3: select full screen mode and play the game with descriptions

Interior of the Earth URL:

http://world-geography-games.com/earth/index.html

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Unit -2

Landforms

Learning Objectives

- To understand the landforms produced by running water
- To describe the landforms created by glacial action
- To learn about the landforms which are produced by wind action
- To gain knowledge about land forms formed by sea waves.

Introduction

In the earlier class, we have learnt that the surface of the earth is not the same everywhere. The earth has an infinite variety of landforms named mountains, plateaus, plains, valley etc., Some parts of the lithosphere may be rugged and some flat. These landforms are a result of two processes. They are i. The Endogenic Process ii. The Exogenic Process

(i) The Endogenic Process

The ***endogenic process*** (internal process) leads to the upliftment and sinking of the earth's surface at several places.

(ii) The Exogenic Process

The ***exogenic process*** (external process) is the continuous wearing down and rebuilding of the land surface.

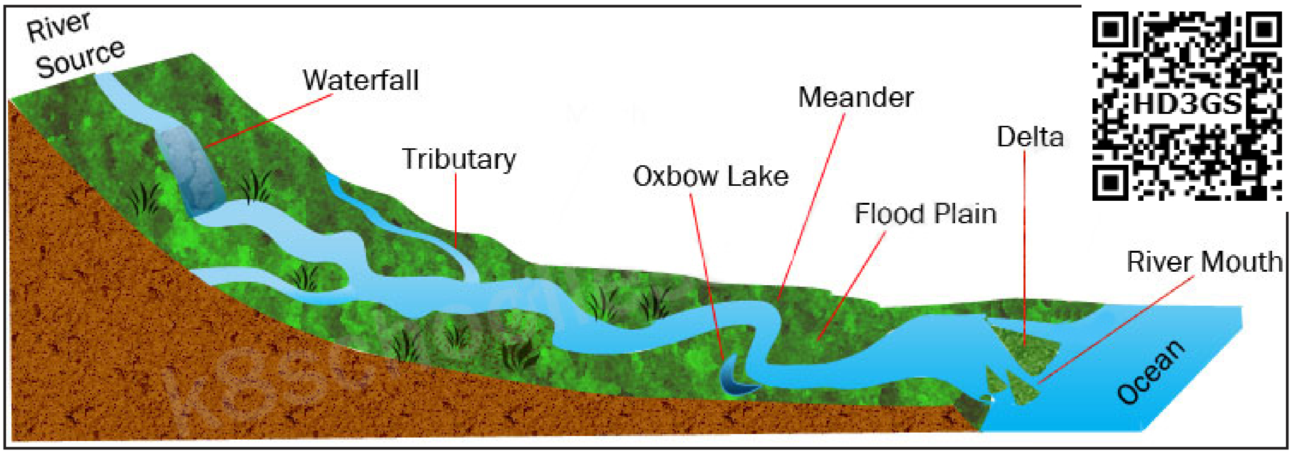
Gradation is the process of levelling of highlands through erosion and filling up of lowlands through deposition.

Landforms

The landscape is being continuously worn down by two processes – ***weathering and erosion***. ***Weathering*** is the breaking and falling apart into small pieces of the rocks on the earth's surface. ***Erosion*** is the wearing down of the landscape by different agents like water, wind, ice and sea waves. The eroded material is carried away by water, wind, etc. and eventually deposited. This process of erosion and deposition create different landforms on the surface of the earth.

River

The water flowing from its source to river mouth, along a definite course is called a ***River***. Rivers generally originate from a mountain or hill. The place of origin of the river is known as its ***Source***. The place where it joins a lake or sea or an ocean is known as ***River mouth*.**



Land forms formed by River

The running water in the river erodes the mountainous track, which creates a steep-sided valley like the letter 'V' known as ***'V' shaped valley***.

'V' shaped valley

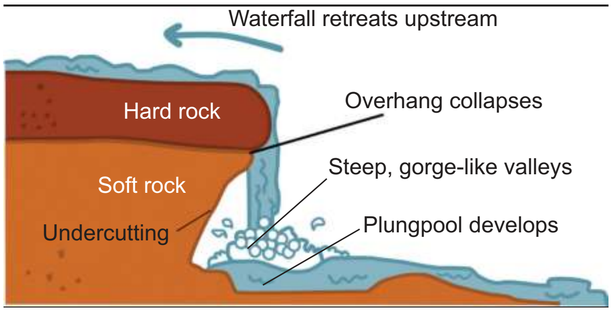
Falling of river water over a vertical step in the river bed is called ***waterfall***. It is formed when the soft rocks are removed by erosion. E.g. Coutrallam falls across the river Chittar in Tamil Nadu.

Plunge pool is a hollow feature at the base of a waterfall which is formed by cavitation. ***Alluvial fan*** is a deposition of sediment occurs at which the river enters a plain or the ***foot-hills***.

Tributary: A stream or river that flows into and joins a main river.

Distributary: A stream that branches off and flows away from a main stream.

DO YOU KNOW? The world's highest waterfall is ***Angel Falls*** of Venezuela in South America. The other waterfalls are ***Niagara Falls*** located on the border between Canada and USA in North America and ***Victoria Falls*** on the borders of Zambia and Zimbabwe in Africa.



As the river enters the plain it twists and turns forming large bends known as ***Meanders***. Eg. Meanders along the River Vellar near Sethiyathope in Cuddalore District, Tamil Nadu. Due to continuous erosion and

Meanders

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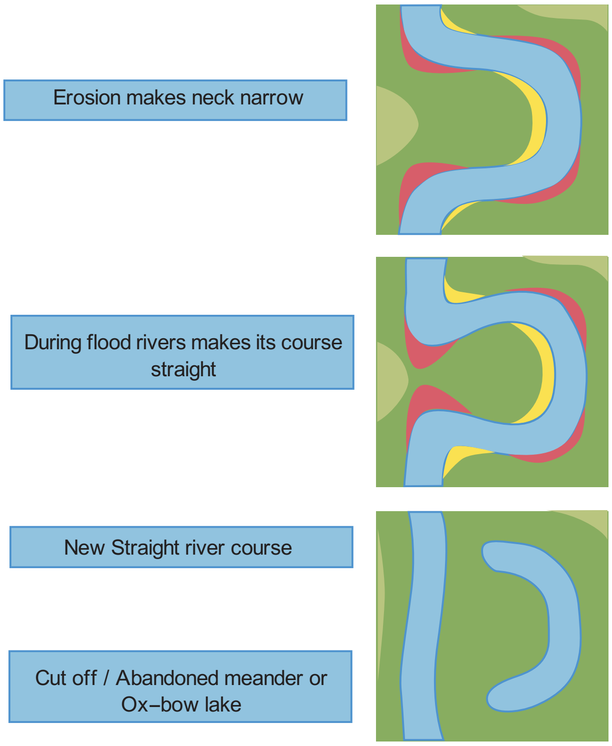
deposition along the sides of the meander, the ends of the meander loops come closer. In due course of time the meander loop cuts off from the river and forms a cut-off lake, also called an ***Ox-bow lake***.



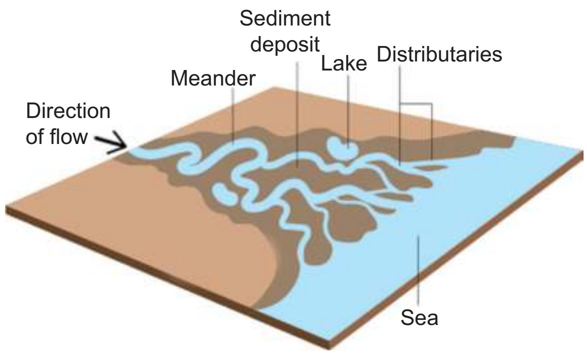
Formation of ox–bow lake

Active Deposition   Active Erosion

> DO YOU KNOW?
>
> The term **'Meander'** has been named on the basis of Meander River of Asia Minor (Turkey), which flows through numerous curves and turns.

At times the river overflows its banks. This leads to the flooding of the neighbouring areas. As the river floods, it deposits layers of fine soil and other material called ***sediments*** along its banks. This leads to the formation of a flat fertile ***floodplain***. The raised banks are called ***levees***.

As the river approaches the sea, the speed of the flowing water decreases and the river begins to break up into a number of streams called ***distributaries***. The velocity of the river becomes so slow that it begins to deposit its load. The collection of sediments from all the mouths form ***Delta***. Deltas are excellent productive lands. E.g. *Cauvery delta, Ganges delta, Mississippi delta.*



Delta

> Find out the names of a few rivers of the world that form a delta with the help of the Atlas.

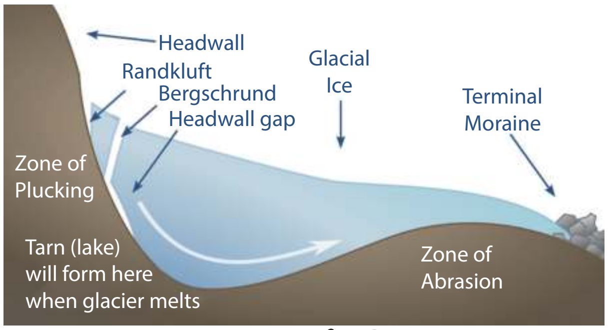
Glacier

A large body of ice moving slowly down a slope or valley due to gravity is called a ***glacier***. Glaciers are grouped into ***Mountain or Valley Glaciers and Continental Glaciers***.

Continental Glacier: The glacier covering vast areas of a continent with thick ice sheets. E.g. *Antarctica, Greenland*

Mountain or Valley Glacier is a stream of ice, flowing along a valley. It usually follows former river courses and are bounded by steep sides. *E.g. The Himalayas and the Alps.*

Glaciers, expose the solid rocks of earth by removing the loose materials found on it.



Formation of a Cirque

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Cirque is a glacially eroded rock basin, with a steep side wall and steep head wall, surrounding an armchair-shaped depression. E.g. *Corrie* – Scotland (United Kingdom), *Kar* – Germany.

As the ice melts, they get filled up the cirque with water and become beautiful lakes in the mountains called as ***Tarn Lake.*** When two adjacent cirques erode towards each other, the previously rounded landscape is transformed into a narrow rocky, steep – sided ridges called ***Arete.***

Arete

U' Shaped Valley is found beneath the glaciers which is deepened and widened by the lateral and vertical erosion. The material carried by the glacier such as rocks - big and small, sand and silt get deposited. These deposits form ***glacial moraines***.

Moraine

Wind

Have you ever visited a desert? Try to collect some pictures of sand dunes. An active agent of erosion and deposition in the deserts is ***wind***.

Mushroom Rock

Winds erode the lower section of the rock more than the upper part. Therefore, such rocks have narrower base and wider top. Wider top rocks in the shape of a mushroom, commonly called ***mushroom rocks.*** An isolated residual hill, standing like a pillar with rounded tops are called ***Inselbergs.*** E.g. Inselberg in the Kalahari Desert of South Africa.

Inselberg

When the wind blows, it lifts and transports sand from one place to another. When it stops blowing the sand falls and gets deposited in low hill – like structures. These are called ***sand dunes***. The crescent shaped sand dunes are called ***Barchans.***

Barchans

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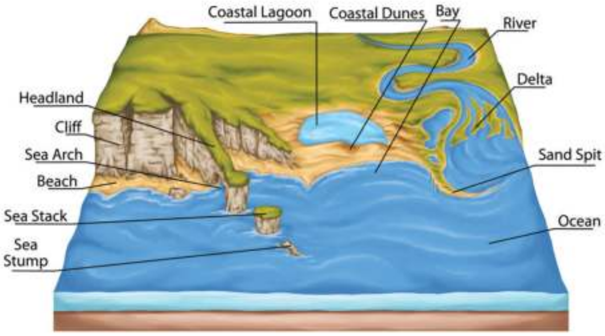
When the grains of sand are very fine and light, the wind can carry it over very long distances. When such sand is deposited in large areas, it is called ***Loess***. Large deposits of loess are found in China.

Loess

> **DO YOU KNOW?** Northern China loess deposits are brought from the Gobi Desert.

Sea waves

A part of the land adjoining or near the sea is called the **Sea coast**. The boundary of a coast, where land meets water is called the **Coast line**. The coastal areas are subject to change due to wave erosion and wave deposition.



Coastal Landforms

The erosion and deposition of the sea waves give rise to coastal landforms. ***Sea Cliffs*** are steep rock faces formed, when the sea waves dash against them. Sea waves continuously

Sea Cliff

strike at the rocks. So Cracks develop. Over time they become larger and wider. Thus, hollow like caves are formed on the rocks. They are called ***Sea Caves***.

Sea cave

As the cavities of sea caves become bigger and bigger only the roof of the caves remains, thus forming ***Sea Arches***. Further, erosion breaks the roof and only walls are left. These wall like features are called ***Sea Stacks***.

Sea arch and Sea stack

The sea waves deposit sediments of sand and gravel along the shores forming **Beaches**. **Sand bar** is an elongated deposition of sand or mud found in the sea, almost parallel to the coast.

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Beach and Sand Bar

Lagoon is a shallow stretch of water partially or completely separated from the sea. E.g. Chilika lake in Odisha, Pulicat lake in Tamil Nadu and Vembanad lake in Kerala are the famous lagoons in India.

Lagoon

DO YOU KNOW?

The longest beach in the world is the **Miami beach** in South Florida in U.S.A. The second longest beach in the world is the **Marina beach** in Chennai.

Miami Beach

Summary

- The landscape is being continuously worn down by weathering and erosion.
- River, glacier, wind and sea waves are the major agents of exogenic forces.
- From its source to its mouth, the river is constantly reshaping the land and giving rise to different landforms.
- The river begins to break up into a number of streams called distributaries.
- Deltas are excellent productive lands.
- Glacier is large body of ice moving slowly down a slope due to gravity.
- Moraines are glacial deposits.
- Wind is the active agent of erosion and deposition in deserts.
- The sea waves deposit sediments of sand and gravel along the shores forming beaches.

Glossary

Gradation	The process of leveling of highlands through erosion and filling up of lowland through deposition.	சமநிலைப் படுத்துதல்
Weathering	Breaking and crumbling up of rocks on the earth's surface.	வானிலைச் சிதைவு
River mouth	The place where the river joins a lake or an ocean.	ஆற்று முகத்துவாரம்
Tributary	A stream or river that flow into and joins a main river.	துணை ஆறு
Meander	Twists and turns forming large bends in the river.	ஆற்று வளைவு
Delta	Large Fan shaped sediments formed by river deposition	டெல்டா
Cirque	The arm chair shaped depression with steep sleep sided wall formed by glacial erosion.	சர்க்
Barchans	The crescent shaped sand dunes.	பிறைவடிவ மணற்குன்று
Lagoon	A shallow stretch of water partially separated from the sea.	காயல்

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Evaluation

I. Choose the correct answer

1. ____________ is a deposition of river sediments along the foot-hills.
   a) Plunge pool b) Alluvial fan
   c) Flood plain d) Delta
2. Courtallam falls is located across the____________ river.
   a) Cauvery b) Pennar
   c) Chittar d) Vaigai
3. The landform created by glacial deposition is
   a) Cirque b) Arete
   c) Moraine d) Tarn lake
4. Large deposits of loess are found in
   a) USA b) India
   c) China d) Brazil
5. Land forms which are not associate with wave erosion ____________
   a) Cliffs b) Sea arches
   c) Stacks d) Beaches

II. Fill in the blanks

1. The process of breaking and crumbling of rocks is ____________.
2. The place where the river joins a lake or a sea is known as ____________.
3. Inselbergs are found in the ____________ desert in South Africa.
4. A cirque is known as ____________ in Germany.
5. The longest beach in the world is ____________.

III. Match the following

1.	Breaking and crumbling of rocks	-	Glacier
2.	Abandoned meander loops	-	Barchans
3.	Large body of moving ice	-	Lagoon
4.	Crescent shaped sand dunes	-	Weathering
5.	Vembanad lake	-	Oxbow lake

IV. Consider the following statement and tick (✓) the appropriate answer

1. **Assertion (A)**: The deltas are formed near the mouth of the river.
   Reason (R) : The velocity of the river becomes slow when it approaches the sea.
   a) Both A and R are correct
   b) A is correct and R is wrong
   c) A is wrong and R is correct
   d) Both A and R are wrong
2. **Assertion (A)**: Sea arches in turn become Sea Stacks.
   Reason (R) : Sea Stacks are the results of wave deposition.
   a) Both A and R are correct
   b) A is correct and R is wrong
   c) A is wrong and R is correct
   d) Both A and R are wrong

V. Answer the following

1. Define erosion.
2. What is a plunge pool?
3. How are Ox – bow lakes formed?
4. Name the major landforms formed by glacial erosion.
5. Give a note on Mushroom rocks.
6. What is a lagoon? Give an example.

VI. Distinguish the following

1. Tributary and Distributary
2. ‘V’ shaped valley and ‘U’ shaped valley
3. Continental glacier and Mountain glacier

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VII Give Reason

1. The ends of the meander loops come closer and closer.
2. Flood plains are very fertile.
3. Sea caves are turn into stacks.

VIII Answer in a paragraph

1. Explain different landforms produced by river erosion.
2. Describe the landforms associated with wind.
3. How are aretes formed?

Activity

1. Fill in the corresponding columns with reference to the landform features given below

[Barchan, 'V' Shaped valley, Cliff, Arete, Inselberg, Moraine, Alluvial fan, Lagoon]

2. Identify any one of the following features near your home town and write a note on them.

1. Hill 2. Waterfall
3. River (or) stream 4. Beach.

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3. A. Das Gupta, A.N. Kapoor, *Physical Geography,* S. Chand and Company Ltd, New Delhi.
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S.No	Natural Agents	Landforms	
		Erosion	Deposition
1	River		
2	Glacier		
3	Wind		
4	Sea wave		

ICT CORNER

Landforms

Through this activity you will know about different types of land in the world

PROCEDURE:

Step – 1 Open the Browser and type the URL given below (or) Scan the QR Code.

Step - 2 Go to menu and select any types of land (Ex. Glacier)

Step - 3 Roll over the red dot on the map to the right to choose a glacier

Landforms URL:

http://www.harcourtschool.com/activity/types_of_land_2/index.html

Unit -3

Population and Settlement

Learning Objectives

- To know about human races and their classification
- To learn about the different religions
- To know about the major languages
- To know about the favourable conditions for settlements
- To understand the rural and urban settlements
- To learn the classification of settlements

Introduction

Population Geography is a study of demographic phenomena which includes natality, morality, growth rates etc., through both space and time. Increase or decrease in population indicates population distribution and growth. The study of movements and mobility of population is called migration.

The Races

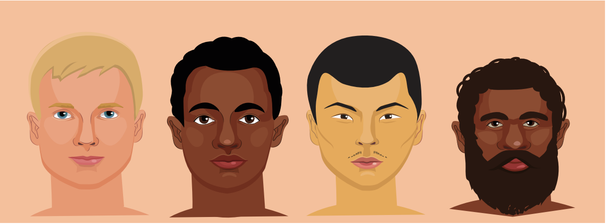
Race has been defined as a biological grouping within the human species. The race is a group of people with more or less permanent distinguishing characteristics that are inherited. The most widely found human racial types are based on visual traits such as head shape, facial features nose shape, eye shape and colour, skin colour, stature, blood groups etc.,

The major world human races are

- Caucasoid
- Negroid
- Mongoloid
- Australoid

Caucasoid

The Caucasoid is known as European race. This group is the one with fair skin and dark brown eyes, wavy hair and narrow nose. The Caucasoid are also found in Eurasia.



CAUCASOID NEGROID MONGLOID AUSTRALOID

> **DO YOU KNOW?** Human geography is the study of Man and his surroundings to the natural environment

Negroid

Negroid have the dark eyes, black skin, black wooly hair, wide nose, long head, and thick lips. They are living in different parts of Africa.

Mongoloids

The mongoloid race is commonly known as the Asian-American race. The mongoloid have the light yellow to brown skin, straight hair, flat face, broad head and medium nose. Such people are found in Asia and Arctic region

Australoids

Australoids have wide nose, curly hair dark skin, and short in height. They are living in Australia and Asia.

Races of India

India is said to be one of the cradle lands of human civilization. The ancient Indus valley civilization in India is believed to have been of Dravidian origin in northern India. The Dravidian people were pushed south when the Indo-Aryan came in later. South India was dominated by the three Dravidian kingdoms of the Chera, the Cholas, and the Pandyas. The Dravidian languages are Tamil, Telugu, kannada, Malayalam and Tulu almost all the Dravidians live in southern part of India.

Religion

Religion means a particular system of faith and worship, which brings human being with human society. Religion, is a symbol of group identity and a cultural rallying point.

Classification of Religion

a) Universalizing Religions

Christianity, Islam and Buddhism.

b) Ethnic Religions

Judaism, Hinduism and Shintoism.

c) Tribal or Traditional Religions

Animism, Shamanism and Shaman.

Religion	Place of worship
Buddhism	Vihara
Christianity	Church
Hinduism	Temple
Islam	Mosque
Jainism	Basadi
Judaism	Synagogue
Zorostrianism	Agiyari

Language

Language is a great force of socialization. Language, either in the written or oral form, is the most common type of communication. Language promotes the transmission of ideas and the functioning of political, economic, social and religious systems.

Major Languages in the world

- Tamil
- Hindi
- Chinese
- English
- Spanish
- Portuguese
- Russian
- Arabic
- German

Languages of India

India has many languages and culture. Each state has its own language. 22 major languages were recognised by Indian Constitution. Kashmiri, Urdu, Punjabi, Hindi, Rajasthani, Gujarati, Bengali and Assamese are spoken in North India.

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The main languages of the Dravidian family are Tamil, Telugu, Kannada, Malayalam etc., These languages are mainly spoken in southern India.

Date	Event
11th July	World population day
21st February	International mother language day
Third Sunday in January every year	World Religious day
21st May	The World cultural diversity day

Today usage of language has changed. It is often used as communicational skill. With the different means of communication and fast moving world advancement in technology helps in understanding the different languages very easily. These technologies have really brought the world closer.

Settlement

Settlement is a place where people live and interact through activities such as agriculture, trading and entertainment. A rural settlement is a community, involved predominantly in primary activities such as agriculture, lumbering, fishing and mining. An urban settlement engages in predominantly in secondary and tertiary activities, such as industries, trade and banking. A rural settlement tends to have a small population and low population density. Urban settlement often has a large population size and high population density.

Site and situation refers to the location of the actual settlement. The initial choice of a site for a settlement depends on how it is useful for meeting our daily needs, like water supply, availability of farmland, building material and fuel etc.,

Old House Types

In the early periods of human settlement, houses were built using local materials. The form of the house was closely related to the environment. In the agricultural regions, houses were built with mud walls and the roof was made of stalks of paddy (or) other crops of grass (or) thatch. Local wood was used to provide frame for the roof. Such old houses had wide verandahs and an open air circulation. The size of the house depended on the economic status of its inhabitants.

Patterns of Settlements

Settlements are classified into Compact settlements and Dispersed settlement

Compact settlements

Compact settlement is also known as nucleated settlement. In this type large number of houses are built very close to each other such settlement develop along the river valleys and fertile plains. In India compact settlements are

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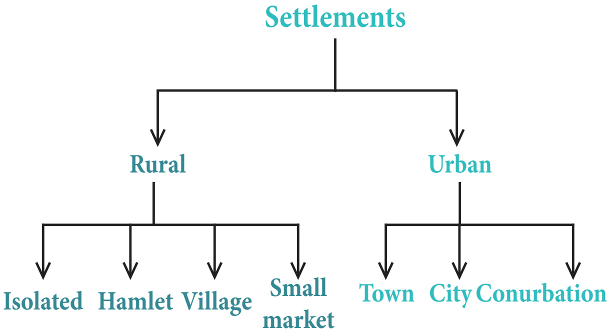
[redacted]

found in the northern plains and the coastal plains of peninsular India.

Dispersed Settlements

Dispersed settlements are generally found in the areas of extreme climate, hilly tracts, thick forests, grasslands, areas of extensive cultivation. In these settlements, houses are spaced far apart and after interspersed with fields. In India this type of human settlement is found in the northern kosi tract, the Ganga delta ,the Thar Desert of Rajasthan and the foot hills of Himalayas and the Niligris.

A hierarchy of settlements



Rural settlement

Rural settlements are predominantly located near water bodies such as rivers, lakes, and springs where water can be easily available. People choose to settle near fertile lands suitable for agriculture, along with the provision of other basic needs. Hence, they prefer to live near low lying river valleys and coastal plains suited for cultivation. The availability of building materials like wood, stone and clay near settlements is another advantage, for settlements to be built.

Factors Influencing Rural Settlement

- Nature of topography
- Local weather Condition
- Soil and water resources
- Social organisation
- Economic condition

Pattern of Rural Settlement

The pattern of settlement has been defined as the relationship between a house or building to another. A rural settlement pattern is a function of relief, climate, water supply and socio-economic factor. It is broadly classified under the following patterns, such as Linear, Rectangular, Circular, Star like pattern etc.,

In a **Linear settlement,** houses are arranged along the either side of a roadways, railways line, river (or) canal,the edge of a valley, etc.,

Linear settlement

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e.g. settlements found in the Himalayas, the Alps, the Rockies.

The **rectangular settlements** are almost straight, meeting each other at right angles. Such a settlement is found in plain areas (or) inter montane plain. E.g., settlements found in Sutlej. Houses built around a central area are known as **Circular pattern of settlements.** Such settlement develop around lakes and tanks. The **Star like pattern of settlement** develops on the sites and places where several roads converge and houses spread out along the sides of roads in all directions. e.g. The Namakkal urban settlements

Star like pattern

Circular pattern

DO YOU KNOW?

Pilgrim settlement may come up around a place of worship(or) any spot with a religious significance. E.g. settlements in Palani Hills, Tamil Nadu.

Wet Point Settlement

A wet point settlement is located near water sources in arid regions.

Dry Point Settlement

A dry Point settlement is located in low-lying areas in the regions of excessive dampness. Dry point settlements are not affected by flood or any other source of water. Such settlements are found in the coastal plains of Kerala and deltas along the east coast of India.

Urban Settlements

The settlements in which most of the people one engaged in secondary and tertiary activities are known as urban settlements. Town, cities, and the areas of large cities are referred to as urban areas.

Classification of Urban Settlements

The definition of urban area varies from one country to another. Some of the common basis of classification are

- Size of population
- Occupational structure
- Administration

Town

Town is a general name for an urban place, usually a settlement meeting a prescribed minimum population threshold. The settlement with a population more than 5000 people is called a town. Basis on the function cities can be classified into towns, such as administrative, cantonment, academic etc.,

City

The term City is generally applied to large urban places with a central business district. In India an urban place with more than one lakh population is considered as a city .

Mega city

A mega city is a very large city typically with a population of more than 10 million people.

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A mega city can be a single metropolitan area. E.g. Canton, Tokyo, Delhi, Mumbai are some of the examples of megacities.

World Health Organization (WHO) suggests that among other things a healthy city must have

- A Clean" and "Safe" environment
- Meets the basic needs of "All" its inhabitants
- Involves the "Community" in local government
- Provides easily accessible "Health service.

Megalopolis

The word megalopolis is given to a large settlement which is formed by the combination of two or more large cities whose total population exceeds ten million. The region made up of cities between Boston and Washington D.C is a well-known megalopolis. In India, Kolkata is the largest urban area which is a megalopolis. Gandhinagar, Surat, Vadodara, Rajkot in Gujarat are the important megalopolis cities in India.

Conurbation

A Conurbation is a region comprising of a number of cities, large town, and other urban areas that through population growth and physical expansion have merged to form one continuous urban (or) industrially developed area. Mumbai in Maharashtra, Gurgaon, Faridabad in Haryana, Noida in Uttar Pradesh are the conurbation cities of India.

Satellite Town

A satellite town is a town designed to house the over population of a major city, but is located well beyond the limits of that city. Satellite towns are generally located outside the rural urban fringe. In India most satellite towns are purely residential in character.

Smart City

In an urban region, a city which is very much advanced in terms of infrastructure, real estate, communication and market availability is called a Smart City. The first ten smart cities of India are Bhubaneshwar, Pune, Jaipur, Surat, Ludhiana, Kochi, Ahmedabad, Jabalpur, Vishakappattinam, Solapur and Davanagere. Tamil Nadu has 12 major cities to be transformed as smart cities. They are Chennai, Madurai, Tirunelveli, Tiruchirappalli ,Thanjavur, Tiruppur, Salem, Vellore, Coimbatore, Thoothukudi, Dindigul and Erode.

Rural	Urban
Rural areas have predominantly primary activities (agriculture)	Urban areas have domination of secondary and tertiary activities (Industries)
Sparsely populated	Densely populated
Villages and hamlet	Cities and towns
Simple and relaxed life	Fast and complicated life

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Summary

- ❖ Races has been defined as a biological grouping within the human species, distinguished or classified according to genetically transmitted differences.
- ❖ Caucasoid Negroid Mangoloid Australoid are the major races.
- ❖ Language is a cultural form of enduring value and a culture can survive with the presence of language only.
- ❖ Settlement may be classified on basis of occupation as rural (village) and Urban (town).
- ❖ Compact settlements develop along river valleys and fertile plains.
- ❖ Dispersed settlement are generally found in the areas of extreme climates, hill tracks, thick forest, grassland and in poor agricultural land.
- ❖ Smart city is a city which is very much advanced in terms of infrastructure.

Exercises

I. Choose the correct answer

1. Caucasoid race is also known as ___________ race
   - a) European
   - b) Negroid
   - c) Mangoloid
   - d) Australoid

2. ___________ Race is Known as Asian - American Race
   - a) Caucasoid b) Negroid
   - c) Mongoloid d) Australoid

3. World population day ___________
   - a) September 1 b) June 11
   - c) July 11 d) December 2

4. Rural settlements are located near ___________
   - a) Water bodies b) Hilly areas
   - c) coastal areas d) desert areas

5. Arrange the following in terms of size
   - 1) City 2) Megalopolis
   - 3) Metropolis 4) Conurbation
   - a) 4,1,3,2 b) 1,3,4,2
   - c) 2,1,3,4 d) 3,1,2,4

II. Fill in the blanks

1. The Bushmen is found mainly in ____________ desert of South Africa
2. Lingustic stock is a group of ____________ family sharing features and its origin
3. In ___________ settlements, where most of the people are engaged in secondary and tertiary activities
4. ___________ towns are generally located outside the rural Urban fringe.
5. ___________Settlement Come up around a place of Worship

III. A. Match the following

1.	Caucasoid	–	Asian
2.	Negroid	–	Australia
3.	Mongoloid	–	European
4.	Australoid	–	African

B. Match the following

1.	Sutlej-Ganga plain	–	Dispersed settlement
2.	Nilgris	–	Star like pattern
3.	South India	–	Rectangular pattern
4.	Seacoast	–	Compact settlement
5.	Haryana	–	Circular settlement

IV. Consider the following statement and (√) Tick the appropriate answer

1. **Assertion** (A): There are numerous languages spoken in the world

   Reason (R): The linguistic diversity in the world is vast.

   a) A and R are correct and R explains A.

   b) A and R are correct but R does not explain A.

   c) A is incorrect but R is correct.

   d) Both A and R are incorrect.

2. **Assertion** A: Palani Hills in Tamil Nadu is an example for pilgrim settlement

   Reason (R): Iron and steel industry is located there

   a) R is the correct explanation of A

   b) R is not the correct explanation of A

   c) A is wrong and R is correct A

   d) A is correct R is wrong

V. Circle the odd one out

1. Fishing, lumbering, agriculture, banking
2. Himalayas, Alps, Rocky, Ganga
3. Chennai, Madurai, Tirunelveli, Kanchipuram

VI. Answer the following

1. What are the classification of Races?
2. What is language?
3. Define settlement
4. On what basis Urban settlements are classified?
5. Write a note on smart city

VII. Give reason

1. Mumbai is a mega city
2. Himalayas have dispersed settlement.

VIII. Distinguish between

1. Language and Religion
2. Negroid and Mangoloid
3. City and town
4. Urban settlement and rural settlement

IX. Answer the following in a paragraph

1. Write about the four major classification of races.
2. What are the factors influencing rural settlement?
3. What are types of rural settlement? Explain any three.

X. Activity

Analyze

1	Where do you live?	Rural / Urban
2	Name the pattern of settlement	
3	Sources of water available in your area	
4	What is the important activity of your locality?	
5	Name the types of transport available in your locality?	

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CIVICS

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Unit -1

Equality

Learning Objectives

- To understand the meaning of Equality
- To know the importance of Equality
- To learn the different types of Equality
- To know the various Articles of our constitution that have guranteed Equality

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Introduction

Nature has made man inequal in colour, height, talent, physical strength etc., and the natural inequalities can never be rectified. Even the twins looking like the similar are not equal in their abilities. Man made inequalities on the basis of caste, religion, language, economy etc can be rectified. It is universally accepted that people are differed in their capacity, ability, attitude etc but at the same time, it is also accepted that they should be given equal opportunities for the development of their skills and talents.

What is Equality?

Equality is ensuring individuals or groups that are not treated differently or less favourably on the basic of specific protected characteristic, including areas of race, gender, disability, religion or belief, sexual orientation and age.

According to Prof Laski "Equality does not mean identity of treatment, the sameness of reward. It means first of all absence of social privilege, on the second it means that adequate opportunities are laid upon to all".

Importance of Equality

Equality is a powerful moral and political ideal that has inspired and guided human society for many centuries. The concept of equality invokes the idea that all human beings have equal worth regardless of their caste, colour, gender, race or nationality. The democratic ideals such as liberty, equality etc are meaningful and effective only when they are implemented with justice.

Kinds of Equality

Social equality

Social equality means that all citizen are entitled to enjoy equal status in society. There should not be any discrimination of caste, creed, colour and race. All should have equal opportunity to develop their personality and to complete goals.

Civil Equality

Civil equality is enjoyment of civil rights by all citizen. There should not be any discrimination of superior or inferior, the rich or the poor, caste or creed. Equal rights should be available to all the persons and nobody should be denied enjoyment of any rights. Rule of law is in force in England and in the eyes of law all are equal and equal treatment is given to all by the rule of law. In India the same rule of law is followed.

> Rule of law was advocated by A.V.Dicey, the British legal luminary.

Political Equality

All the democratic countries including India have guaranteed the political rights to all citizens. It includes

- ❖ Right to vote
- ❖ Right to hold public Office
- ❖ Right to criticise the government

Citizens should have equal opportunity to actively participate in the political life. These rights can be enjoyed through the Universal Adult Franchise. In India the voting right is given to all the citizens who has attained

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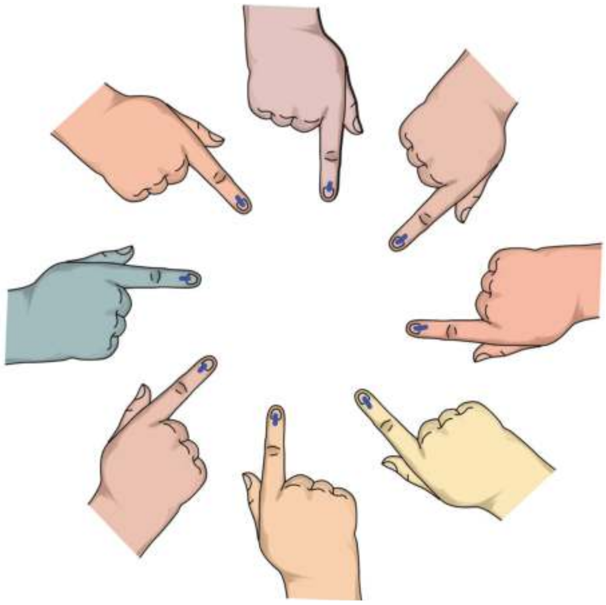

18 years of age without any discriminations. India is the first country to give right to vote to women from the very first general election held in the year 1952. In Switzerland the right to vote is given to women in 1971. Any person who has completed the age of 25 years can contest in the election in India. Right to criticise the government is also very important right and the people can express their resentment through demonstrations. The value of the vote of the Prime Minister and value of vote of common man in general election is same which denotes political equality.

Gender Equality

All human beings, both men and women, are free to develop their personal abilities and make choices without any limitations. woman were not given equal rights and they were considered as weak as compared to man and they were placed in a secondary position to men. They should be treated equally. It does not mean that women and men have to become the same, but their rights, responsibilities and opportunities will not depend on whether they are born male or female.Gender Equality is the equal right of both men and women to have access to opportunities and resources. They have right to participate in the economic sphere and make important decisions. Women with their talent and hard work have proved that their ability is not less than men in any aspect. Nowadays, women are successfully working in many fields like Border Security force, Indian Air Force, etc. For the uplift of women 50% reservation has been given for women in local bodies.

UNICEF says Gender Equality "means that women and men, and girls and boys, enjoy the same rights, resources, opportunities and prolictions. It does not require that girls and boys, or women and men, be same, or that they be treated exactly alike."

As of 2017, gender equality is the fifth of seventeen sustainable development goals of the United Nations.

> Efforts were made by many social activists from the 19th century for the development of women. The noted champions of this cause were Raja Rammohan Roy, Ishwar chandra Vidyasagar Dayanand Saraswati, Mahadev Govind Ranade, Tarabai Shinde, Begum Rokeya Sakhawat Hussain, Savithribha Phule. They worked hard to get equal status to the women.

Human dignity

Dignity means self – respect. Human dignity is the most important human right from which all other fundamental rights derive. Dignity is the quality of being honourable, noble and excellent. Every human being should be regarded as a very valuable member of the community.

Equality of Opportunity and Education

All the individuals should have similar chances to receive education. They should

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have similar opportunities to develop their personality. We need equality to get equal treatment in society. If we treat equality we can earn respect and dignity.

Equality in Indian constitution

Almost the constitution of all the countries in the world have guaranteed equality. Likewise, the constitution of India has also guaranteed equality to all citizens by providing Articles from 14-18.

Article 14 –	guarantees to all the people equality before law.
Article 15 –	deals with the prohibition of discrimination.
Article 16 –	provides equality of opportunity in matters relating to Public employment.
Article 17 –	abolishes the practice of untouchability .
Article 18 –	abolishes the titles conferred to citizen.

Equality before law and equal protection of law have been further strengthened in the Indian constitution under Article 21.

We can promote equality by

- ❖ Treating all fairly
- ❖ Creating an inclusive culture
- ❖ Ensuring equal access to opportunities
- ❖ Enabling to develop full potential
- ❖ Making laws and policies
- ❖ Education.

Conclusion

India is the largest democratic country in the world. Equality and justice are the pillars of democracy. Justice can be achieved when people are treated equality. Equality is so important because it preserves the dignity of an individual. Equality is an important principle for a society to function.

Summary

- ❖ Liberty and Equality are the two fundamental concepts of democracy.
- ❖ All people should be equal before law and everybody should be given equal chance and opportunity to participate in political life.
- ❖ Civil equality implies equality of all before law.
- ❖ Gender equality means both the men and women should be treated equally.
- ❖ The various laws programmes of the government aim at gender equality.

Glossary

Equality	absence of any privilege to anybody	சமத்துவம்
Rule of law	rule based on law	சட்டத்தின் ஆட்சி
Monarchy	government by a single person	முடியாட்சி
Privileges	special concessions	சலுகைகள்
Discrimination	difference	பாகுபாடு

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Evaluation

I. Choose the correct answer

1. Which one of the following does not come under Equality?
   a) Non discrimination on the basis of birth, caste, religion, race, colour, gender.
   b) Right to contest in the election.
   c) All are treated equal in the eyes of law.
   d) Showing inequality between rich and poor.
2. Which one of the following is comes under political Equality?
   a) Right to petition the government and criticize public policy.
   b) Removal of inequality based on race, colour, sex and caste.
   c) All are equal before the law.
   d) Prevention of concentration of wealth in the hands of law.
3. In India, right to vote is given to all the citizens at the age of ____________
   a) 21 b) 18 c) 25 d) 31
4. Inequality created by man on the basis of caste, money, religion etc is called as____
   a) Natural inequality
   b) Manmade inequality
   c) Economic inequality
   d) Gender inequality
5. In Switzerland, the right to vote is given to women in the year
   a) 1981 b) 1971 c) 1991 d) 1961

II. Fill in the blanks

1. Civil equality implies equality of all before __________.
2. The Indian constitution deals about the Right to equality from Article ___ to ___.
3. Right to contest in the election is a ________ Right.
4. Equality means, absent of _________ privileges.

III. Give short answer

1. What is Equality?
2. Why is gender Equality needed?
3. What is civil Equality?

IV. Answer in detail

1 Write about the importance of Equality.
2. What is political Equality?
3. How does the Constitution of India protect the Right to Equality?

V. HOTs

1. How can we eliminate inequality at school level?

VI. Life Skills

	Enumeration of Different types of equality	Type of equality
1.	There should not be any discrimination among the citizens on the basis of status, caste, colour, creed and rank, etc.	
2.	Equality of all before the law.	
3.	Right to vote, right to hold public office and right to criticize the government.	
4.	My ability is not less than men in any aspect.	

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Unit -2

Political Parties

Learning Objectives

- ❖ To define what political party is and to understand the importance of the political party
- ❖ To know the role and function of a political party
- ❖ To understand the party system in India and the role of opposition party

Student Siva :	Good morning Mam. May I come in?
Teacher Ms.Aadhi:	Good morning Siva. Always you will be on time. Why are you so late today?
Siva:	Sorry mam. I was delayed due to a procession.
Ms. Aadhi:	What is it about? Who arranged this procession?
Siva :	My uncle said "That is the work of the political party".
Ms. Aadhi:	Oh. I see!
Siva :	What is political party mam? Why are they doing so?
Ms. Aadhi:	Wait. Today I am going to teach about political parties. Let us know all about that.

In earlier times, emperors and kings ruled India. The king was the supreme head of the Legislative, Executive and Judiciary branches. Governance was in the hands of one person. The welfare of the people depended on the ruler. People had no rights to do against the ruler. Later foreign powers made India as their colonies. The colonies became states after Independence was declared.

In 1950, India became a democratic country. A vibrant democracy needs a strong political party system. Party System is a modern phenomenon. In a democracy, people are able to voice their opinions on any subject.

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What are Political Parties?

Political parties are the voluntary associations of individuals with broad ideological identity who agree on some policies, formulate an agenda and programme for the society. Political parties seek to implement their policies by winning people's support through election. Parties vary in size and in the ways they organize themselves as well as in their policies.

Any political party has three basic components

- ❖ the leader
- ❖ the active members
- ❖ the followers

Importance of political parties

Political parties are the backbone of democracy. Parties are not part of the formal arrangement of a government but they are essential elements to form the government. They formulate public opinion. They serve as intermediaries between the citizen and the policy makers.

A party is recognized if

- ❖ it has been engaged in political activity for five years.
- ❖ its candidates secure at least six percent of total votes in the last general election.

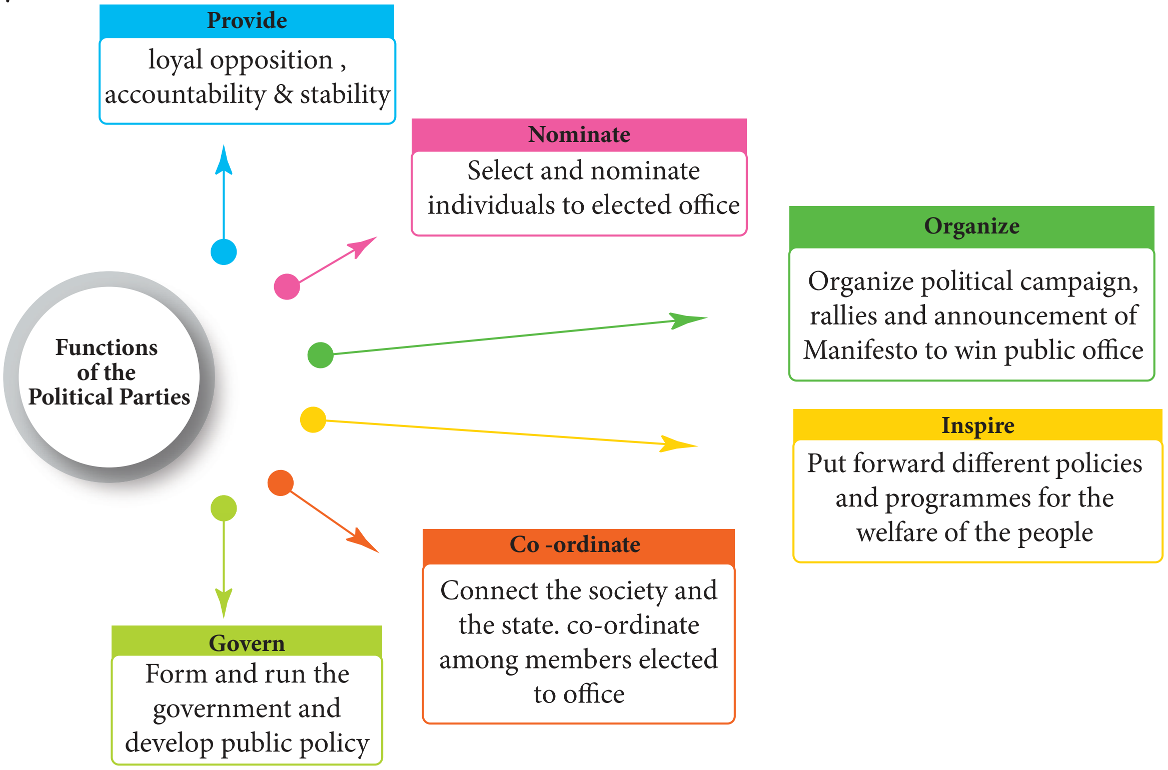
Characteristics of Political Parties

Political parties

- ❖ consist a group of persons of common goals and shared values.
- ❖ have its own ideology and programme.
- ❖ capture power only by constitutional means.
- ❖ endeavour to promote the national interest and national welfare.

Party '*manifesto*'

During the campaign before election, the candidates announce the programmes and policies that their party will undertake if voted to power.



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Types of Party System

There are three major types of party system.

Single Party System: a system in which a single political party has the right to form the government. Single party is existed in the communist countries such as China. North Korea and Cuba.

Bi – Party System: In Bi –Party system the power is usually shared between two parties. Of the two parties one becomes the ruling party and the other becomes opposition. eg Bi-Party system can be seen in U.K. (the Labour Party and the Conservative Party) and in U.S.A (the Republican Party and the Democratic Party)

Multi – Party System: When the competition for power is among three or more parties, the system is known as multi party system. This type of party system is in existence in India, France, Sweden and Norway etc.

Party system in India

Countries that follow a federal system have two kinds of parties. India's party system originated in the late 19th century. In fact India has the largest number of political parties in the world. In India we find the existence of political parties at three levels. They are National parties, Regional parties, and Registered but unrecognised parties (independent candidates). Every party in the country has to register with Election Commission.

Election Commission – Statutory body

The Election Commission of India is an autonomous, constitutional authority responsible for administering elections. Its head quarter is located in New Delhi.

HOW TO FORM A POLITICAL PARTY?

Must get registered with Election Commission of India

Must have atleast 100 members. Each member needs to hold a voting card.

Must write a Party Constitution

Criteria for Recognition

The Election Commission of India has some criteria for the recognition of political parties in India.

National Parties

- Parties that secure atleast 6% of the valid votes in Lok sabha election or assembly elections in four states.
- They must win 4 seats in Lok sabha from any State/States.
- They have to win 2% of seats in Lok sabha from atleast 3 different states in the latest general election.

Regional / State Parties

- Parties that secures atleast 6% of the valid votes in the state legislative assembly election.
- They must win one Lok Sabha seat for every 25 seats or atleast 2 seats in Legislative assembly.
- They need to win a minimum of 3% of the total number of seats in Legislative Assembly.

Independent candidate

- A candidate who wishes to contest in either of the Parliamentary, State Assembly but does not have an affliation with the other parties, may contest the election as an Independent candidate.

Recognized parties

Parties that fulfill these criteria are called recognized parties. They are given a unique symbol by the Election Commission.

A registered but unrecognized political party cannot contest election on its own symbol. This party has to choose one symbol form free symbol 'poll panel' announced by the Election Commission.

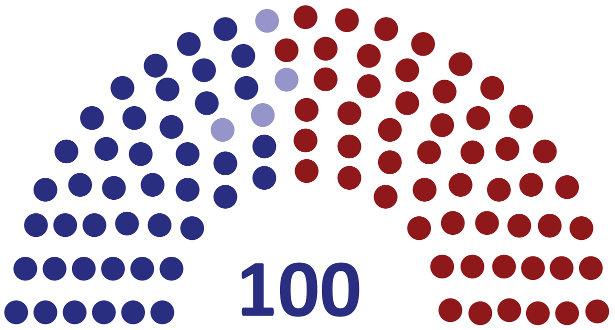
Free symbols 'Poll panel'

As per the Election Symbols order 1968, symbols are either reserved or free.

- A reserved symbol is meant for a recognized political party.
- A free symbol is reserved for unrecognized party.

Majority Party

The Political Party whose number of candidates elected is more than the others is called the majority party. The Majority Party forms and runs the government. They select and appoint their ministers to run the government. They play a decisive role in making laws for the country.



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Minority Party

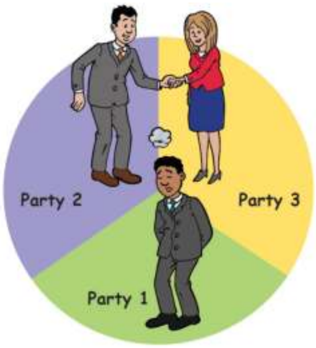
Those with lesser number of elected candidates are called the minority party.

Opposition Party

The party which gets second largest number of seats next to the majority party in the election is called the Opposition party. An effective opposition is very essential for the successful operation of the democracy. They are as important as that of ruling party. They check the autocratic tendencies of the ruling party. They critically examine the policies and bills introduced by the government. They raise their voice on the failures and wrong policies. They highlight important issues which are not acted upon the Government. The leader of the opposition party enjoys the rank of Cabinet Minister.

Coalition Government

In a Multiparty system a single party sometimes may not secure the majority required to form the government. In such a case, some parties join together to form the government. Such government is called Coalition Government.



Electoral Symbols and its importance

An electoral symbol is a standardised symbol allocated to a political party. They play an important role in elections. They can be easily identified, understood, remembered and recognized by the voters. The Election commission has stopped allotting animals as symbols. The only exceptions are the lion and the elephant. The symbol of nationally recognized parties is standard throughout India. That symbol will not be allotted to any other party or individual.

State parties are allotted to certain symbols that no other party can use the symbol in that particular state but which different parties in different states can use the same symbol. (e.g Shiv Sena in Maharashtra and Jharkhand Mukti Morsha in Jharkhand use bow and arrow as their symbol).

Both National and Regional parties trigger the growth of the nation and work for the welfare of the people.

National Party	Regional /State Party
National parties are political parties which participate in different elections all over India.	Regional parties are political parties which participate in different elections but only within one state.
It should be strong enough in at least four states.	It should be strong enough in at least one or two states.
It has an exclusive symbol throughout the country.	A symbol is reserved for it in the state in which it is recognized. But the same symbol can be allotted to different parties in different states.
It resolves State, National and International issues.	It promotes regional and state interest.

Summary

- Modern age is an age of mass society and of large population and party system is a modern phenomenon.
- A group of people with broad common interest who organize to win elections, control government and thereby influence government policies.
- There are three major types of party system (i.e.) single party system, Bi - party system, and Multi - party system.
- In India we have Multi – party system.
- Individual citizen who are not members of a party may also be elected. They are known as Independents.
- Election Commission is responsible for free and fair elections in India.

Glossary

Democracy	Government by the people	மக்களாட்சி
Election manifesto	a public declaration of policies and aims by political parties	தேர்தல் அறிக்கை
Opposition party	a party opposing to the other parties	எதிர்க்கட்சி
Federal system	system of government in which several states form a unity but remain independent in internal affairs	கூட்டாட்சி அமைப்பு
Election commission	a body for implementation of election procedures	தேர்தல் ஆணையம்
Electoral symbols	symbols allocated to a political party	தேர்தல் சின்னங்கள்
Cabinet Minister	member of a parliament or legislative assembly cabinet	கேபினட் அமைச்சர்

Evaluation

I. Choose the correct answer

1. What is meant by Bi-party system?
   a) Two parties run the government.
   b) Two members run a party.
   c) Two major political parties contest election.
   d) None of these.

2. Which system of government does India have?
   a) Single–party system
   b) Bi-party system
   c) Multi-party system
   d) None of these

3. Recognition of a political party is accorded by ________.
   a) The Election commission
   b) The president
   c) The supreme court
   d) A committee

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4. Political parties are generally formed on the basic of ________.

   a) Religious principles

   b) Common interest

   c) Economic principles

   d) Caste

5. Single-party system is found in ________.

   a) India b) U.S.A

   c) France d) China

II. Fill in the blanks

1. ________ form the back bone of democracy.
2. Every party in our country has to register with ________.
3. Political parties serve as intermediaries between the ________ and ________.
4. A registered but ________ political party cannot contest election on its own symbol.
5. The leader of the opposition party enjoys the rank of ________.

III. Match the following

1. Democracy	criticize the government policies
2. Election commission	forms the government
3. Majority party	rule of the people
4. Opposition party	free and fair election

IV. Consider the following statements. Tick (✓) the appropriate answer

1. Which of the following statement is/are correct?

   a) Every party in the country has to register with the election commission.

   b) The commission treats all the parties equally.

   c) Election commission allots a separate symbol for recognized parties.

   d) All the above.

2. **Assertion:** Majority party plays a decisive role in making laws for the country.

   Reason: The number of candidates elected is more than the others in the election.

   a) R is the correct explanation of A.

   b) R is not the correct explanation of A.

   c) R is wrong A is correct.

   d) A and R are wrong.

V. Answer in one or two sentences

1. Which are the basic components of a political party?
2. Name the three major types of party system.
3. Name the countries which follow Bi – party system.
4. Write a note on Coalition Government.

VI. Answer the following

1. Write any four functions of political party?
2. When is a political party recognized as a National Party?

VII. HOTs

1. Is political party necessary for a democratic country?
2. Give any three names of National party, Regional party, and Registered but unrecognized party.

VIII. Activity

1. Write an election manifesto (if you were a party leader).

ICT CORNER

Political Parties

This activity enables the students to know about the Election Commission of India

PROCEDURE :

Step 1: Open the Browser and Install the URL link given below

Step 2: Select “Election India” (Eg: Parties) to get a brief information about “National Parties”

Step 3: Click the Menu button and select any title (E.g Leaders) to view about the leaders profile

Step 4: Touch the menu button and select “Dash board” to know about the status Of upcoming elections and National parties

Step 1

Step 2

Step 3

URL:

https://play.google.com/store/search?q=election (or) scan the QR Code

*Pictures are indicative only

*If browser requires, allow Flash Player or Java Script to load the page.

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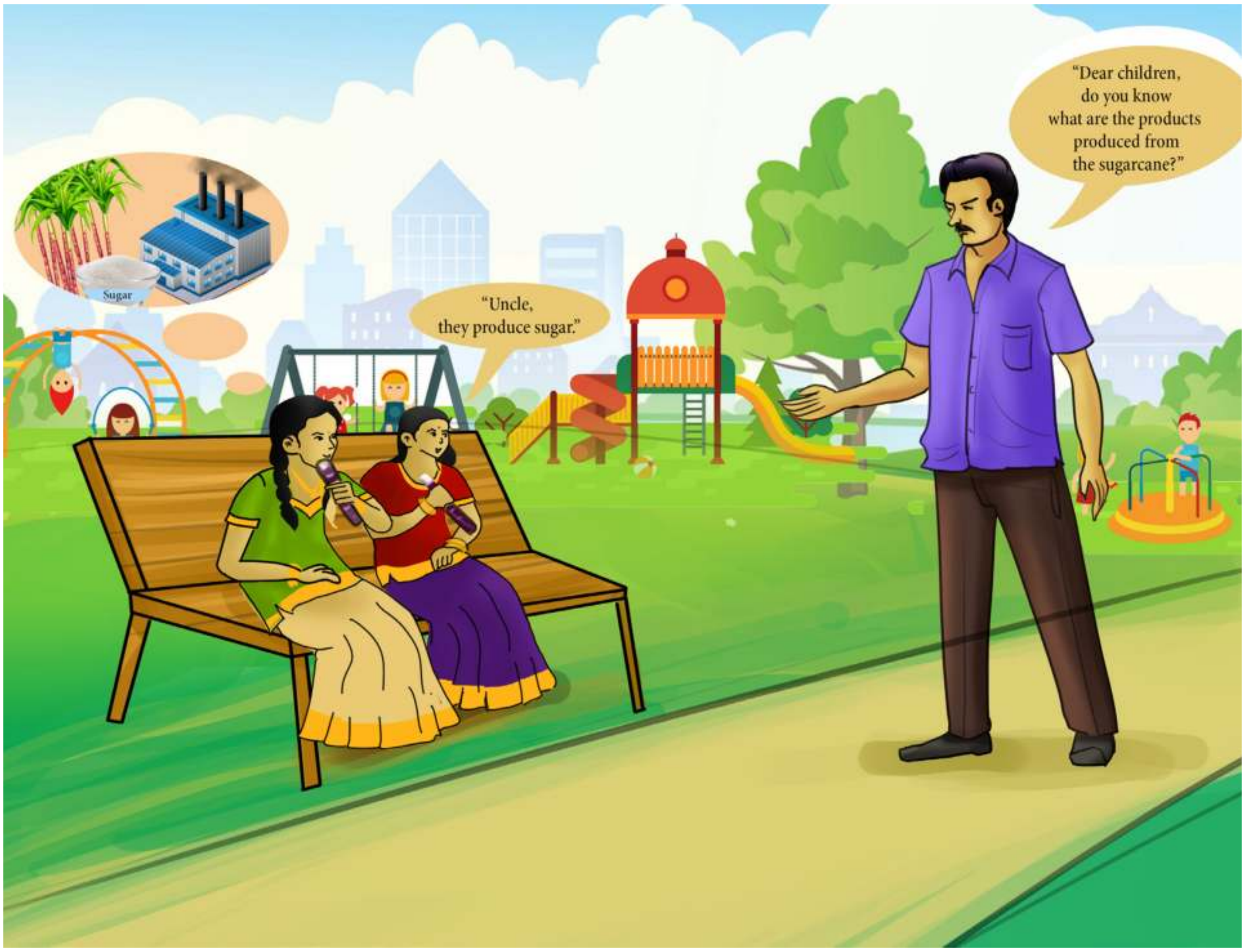
ECONOMICS

Unit -1

Production

Learning Objectives

- To know the meaning of production
- To understand the types of production
- To know the factors of production
- To understand the characteristics of factors of production



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One day Yazhini and Josphine were sitting in a park near their house and eating sugarcane. At that time yazhini's uncle Raja came there and started talking with them.

Uncle : "Dear children, do you know what are the products produced from the sugarcane?.

Both of them thought for a while and said, 'uncle , they make sugar'.

Uncle : You are right. Do you know how they produce sugar for our consumption?.

Yazhini : No uncle. But if you tell us we will know about it uncle.

Uncle : Ok. I shall tell you and you in turn must tell your friends about it.

Yazhini & Josphine : Ok uncle, He began saying.

Sugarcane is cultivated in agricultural fields. This is the primary production. To get sugar, we take sugarcane to the sugar factories, by using the machine we produce sugar. This is the secondary production. So like sugar industries many other industries are known as secondary sectors and generally described as manufacturing sectors.

The tertiary sectors provide all those services, which enable the finished goods to reach in the hands of consumer. These industries include traders, banking, insurance, etc.

Production is the process of changing the raw materials into finished product. Here the factors of production is the input like, sugarcane, machinery, labours, etc. and sugar is the output. Now, let us learn about production and the various factors included in production like land, labour, capital and entrepreneur and its characteristics in detail.

Yazhini and Josphine : Ok uncle.

There are two main activities in an economy such as production and consumption. Similarly there are two kinds in economy, producers and consumers. Well-being is made possible by efficient production and by the interaction between producers and consumers. In the interaction, consumers can be identified in two roles both of which generate well-being. Consumers can be both customers of the producers and suppliers to the producers. The customer's well-being arises from the commodities when they buy and consume. The supplier's well being is related to the income they receive when they sell the commodities and services. In an economy all are consumers but all are not producers or sellers.

Meaning of Production

Production is a process of combining various material inputs and immaterial inputs in order to make something for consumption (the output). It is the act of creating an output, a good or service which has value and contributes to the utility of individuals.

Production in economics refers to the creation of those goods and services which have exchange value. It means the creation of utilities. Utility means want satisfying power of a product. According to the nature of utilities they are classified into form utility, time utility and place utility.

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Types of Utility

Cotton

Cloth

Form utility

If the physical form of a commodity is changed, its utility may increase.

Eg. The demand and uses of cotton increases, if it is converted into clothes.

Place utility

Transportation

If a commodity is transported from one place to another, its utility may increase.

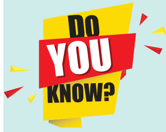
Eg. If rice is transported from Tamilnadu to Kerala, its utility will be more.

Time utility

Warehouse

If the commodity is stored for future usage, its utility may increase.

Eg. If agricultural commodities which are used by the consumers throughout the year like Paddy, Wheat, etc. are stored for future use its utility increases.



Indian Economy is a Mixed Economy. Private and Public Sectors co-exist.

Types of Production

There are three types of production. They are

1. Primary production
2. Secondary Production
3. Tertiary Production

1. Primary Production

Primary production refers to the state of activity in which natural resources are directly used. Since agricultural is given prime importance, it is also referred as agricultural sector production.

Agriculture, forestry, fishing, mining and oil extraction are examples to primary sector.

2. Secondary Production

The process of manufacturing products by using primary products as raw materials is known as secondary level production. Since industries are given prime importance, it is also referred as industrial sector production.

Primary sector and Secondary sector Production

Cotton (Primary sector) – Cotton Industry (Secondary Sector) = Cloth Production

Iron ore (Primary sector) – Iron Industry (Secondary sector) = Material Production

Agriculture

Forestry

Mining

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Cotton Industry

Engineering & Building

Manufacturing of cars, clothing, chemicals, engineering and building etc.. are examples to secondary sector.

3. Tertiary Production

Tertiary production is known as the services which are not visible rendered by the teachers, doctors etc., are to the economy. Banking, insurance, education, health and defence etc.. are examples to service sector.

Defence

Banking

Education

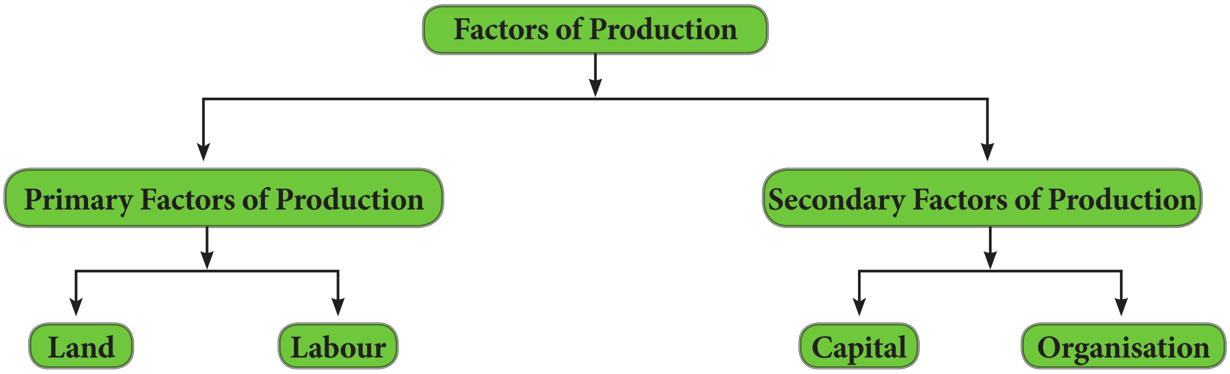
> **DO YOU KNOW?**
> The most to the Gross Domestic Product of our country is contributed by the tertiary sector.

Factors of Production

Factors of production are known as inputs of production which are transformed into output or products. There are two main divisions of factors of production. They are (i) Primary factors of production and (ii) Derived factors of production or Modern factors of production or secondary factors of production.

Primary factors of production are Land and Labour. Derived factors of production are capital and organisation.

Capital is known as investment and the organisation is known as organising Land, Labour and Capital for producing products. Organisation is also known as Entrepreneurship.



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Land

Land as a factor of production refers to all those natural resources or gifts of nature which is provided freely to man. It includes within itself several things such as land surface, air, water, minerals, forests, rivers, lakes, seas, mountains, climate, and weather. Thus, land includes all things that are not made by man.

Land

> Land can take on various forms, on the basis of resources available from a particular piece of Land. For example agricultural land when it is cultivated. Commercial land when it is sold.

Characteristics of Land

1. Land is a Free Gift of Nature

Man has to make efforts in order to acquire other factors of production. But to acquire land no human efforts are needed. Land is not the outcome of human labour. Rather, it existed even long before the evolution of man.

2. Land is fixed in supply

The total quantity of land does not undergo any change. It is limited and cannot be increased or decreased with human efforts. No alteration can be made in the surface area of land.

3. Land is imperishable

All man-made things are perishable and these may even go out of existence. But land is imperishable. Thus it cannot go out of existence.

4. Land is a Primary Factor of Production

In any kind of production process, we have to start with land. For example, it helps to provide raw materials for industries and to produce crops.

5. Land is Immovable

It cannot be transported from one place to another. For instance, no portion of India's surface can be transported to some other country.

6. Land has some Original Indestructible Powers

There are some original and indestructible powers of land, which a man cannot destroy. Its fertility may be varied but it cannot be destroyed completely.

7. Land Differs in Fertility

Fertility of land differs on different pieces of land. One piece of land may produce more and the other may be less.

As a gift of nature, the initial supply price of land is zero. However, when used in production, it becomes scarce. Therefore, it fetches a price accordingly.

Labour

Labour is the human input into the production process. Alfred Marshall defines labour as, 'the use of body or mind, partly or

> **DO YOU KNOW?**
>
> Adamsmith is known as Father of Economics and his Economics is based on wealth. He wrote two classic works,"*The Theory of Moral sentiments(1759)*",and " *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776)".

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Machinery Work

Physical Work

Mind Work

wholly, with a view to secure an income apart from the pleasure derived from the work'

Characteristics of Labour

- Labour is more perishable than other factors of production. It means labour cannot be stored. The labour of an unemployed worker is lost forever for that day when he does not work. Labour can neither be postponed nor accumulated for the next day. It will perish. Once it is lost, it is lost forever.
- Labour is an active factor of production. Neither land nor capital can yield much without labour.
- Labour is not homogeneous. Skill and dexterity vary from person to person.
- Labour cannot be separated from the labourer.
- Labour is mobile. Man moves from one place to another from a low paid occupation to a high paid occupation.
- Individual labour has limited bargaining power. He cannot fight with his employer for a rise in wages or improvement in work-place conditions. However, when workers combine to form trade unions, the bargaining power of labour increases.

Division of Labour

The concept 'Division of Labour' was introduced by Adam Smith in his book '*An Inquiry into the Nature and Causes of the Wealth of Nations*'.

Division of labour means dividing the process of production into distinct and several component processes and assigning each component in the hands of a labour or a set of labourers, who are specialists in that particular process.

Example : A Tailor stitches a shirt in full. In the case of Garments exporters, cutting of cloth, stitching of hands, body, collars, holes for buttons, stitching of buttons etc., are done

Car Manufacturing Unit

Bike Manufacturing Unit

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independently by different workers. Therefore, they are combining the parts into a whole shirt.

Garments Export Unit

Merits of division of labour

- It improves efficiency of labour when labour repeats doing the same tasks.
- It leads to the use of modern machinery in production, resulting in inventions. Ex. More's Telegraphic Codes.
- Time and raw materials are used very efficiently.

Demerits of division of labour

- Repetition of the same task makes labourer to feel that the work is monotonous and stale. It kills the humanity in him.
- Narrow specialization reduces the possibility of labourer to find alternative avenues of employment. This results in unemployment.

> Students are asked to visit the nearest private tailoring shop and Garments Export Industry.
>
> Teacher and students are asked to discuss about the process of making dresses in the tailoring shop and Garments Export Industry.

- Reduce the growth of handicrafts and the worker loses the satisfaction of having made a commodity in full.

Capital

Capital is man made physical goods used to produce other goods and services. In the ordinary language, capital means money. In economics, capital refers to that part of man-made wealth which is used for the further production of wealth. All wealth is not capital but all capital is wealth. According to Marshall, 'Capital consists of those kinds of wealth other than free gifts of nature, which yield income'.

Forms of capital

1. Physical Capital or Material Resources
   Ex. Machinery, tools, buildings, etc.
2. Money capital or Monetary resources
   Ex. Bank deposits, shares and securities, etc.

Office

Machinery

Factory

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3. Human capital or Human Resources
Ex. Investments in education, training and health

Characteristics of Capital

- Capital is a passive factor of production
- Capital is man-made
- Capital is not an indispensable factor of production
- Capital has the highest mobility
- Capital is more flexibility
- Capital is productive
- Capital Lasts Long
- Capital involves present sacrifice to get future benefits

Entrepreneur or Organisation

An entrepreneur is a person who combines the different factors of production (land, labour and capital), in the right proportion and initiates the process of production and also bears the risk involved in it.

The entrepreneur is also called 'Organizer'. In, modern times, an entrepreneur is called 'the changing agent of the society'. He is not only responsible for producing the socially desirable output but also to increase the social welfare.

Characteristics of Entrepreneur

- Identifying profitable investible opportunities
- Deciding the location of the production unit
- Making innovations
- Deciding the reward payment
- Taking risks and facing uncertainties

Students are asked to visit some entrepreneurs in their nearest home town and collect the information of his businesses.

Teacher and students discuss about the entrepreneurs.

Summary

❖ Production is a process of combining various material inputs and immaterial inputs in order to make something for consumption

❖ Utility means want satisfying power of a product.

❖ Utilities are classified according to the nature as form utility, time utility and place utility.

❖ There are three types of production viz, Primary production, Secondary Production, Tertiary or Service Production

❖ Factors of Production Land, Labour, Capital, Organization

❖ The concept 'Division of Labour' was introduced by the Father of Economics Adam Smith in his book ' *An Inquiry into the Nature and Causes of the Wealth of Nations*

❖ An Entrepreneur is a person who combines the different factors of production. (Land, Labour and Capital)

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Glossary

Production	Manufacture	உற்பத்தி
Utility	Usefulness	பயன்பாடு
Organization	Firm	நிறுவனம்
Entrepreneur	Businessman	தொழில் முனைவோர்
Factors	Component	காரணிகள்
Division	Dividing	பகுப்பு
Resources	Assets	வளங்கள்

Evaluation

I. Choose the correct answer

1. Production refers to
   a) destruction of utility
   b) creation of utilities
   c) exchange value
   d) none of these

Q9LVX

2. Utilities are in the nature of
   a) form utility b) time utility
   c) place utility d) all of these

3. Primary factors are
   a) land, capital b) capital, labour
   c) land, labour d) none of these

4. The entrepreneur is also called
   a) exchanger b) Agent
   c) organizer d) communicator

II. Fill in the blanks

1. ________ means want satisfying power of a product.
2. Derived factors are ________ and ________.
3. ________ is a fixed in supply.
4. ________ is the human input into the production process.
5. ________ is the man made physical goods used to produce other goods and services.

III. Match the following

1.	Primary production	-	Adamsmith
2.	Time utility	-	fishing, mining
3.	Wealth of nation	-	entrepreneur
4.	Human capital	-	stored for future
5.	Innovator	-	education, health

IV. Give short answer

1. What is production?
2. What is utility?
3. Name the types of utility.
4. What are the factors of production?
5. Define Labour.
6. Define Division of labour.
7. Write the forms of capital.
8. Write the three characteristics of entrepreneur.

V. Give brief answer

1. Explain the types of production.
2. What is land ? What are the characteristics of land?
3. Explain the merits and demerits of division of labour.
4. Describe the characteristics of capital.

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[redacted]

VI. Activity and Project

1. Students are asked to prepare a chart containing dummy images of primary, secondary and tertiary sectors images.
2. Students are asked to visit local farmers and to discuss about the land and its characteristics. Collect some photographs of land and make an album.

VII. Life skills

1. Students to know about the characteristics of entrepreneur, Set up your classroom like a industry. Some Students are asked to act like a businessman, Do the industries activities. Teacher and students together discuss about the entrepreneur and their important of development of society.

Reference Books

1. H.L.Ahuja-*Principles of Micro Economics*
2. K.P.M.Sundharam-*Business Economics*
3. K.K.Dewett-*Modern Economic Theory*

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